

BREEDING AND NUTRITION OF ANIMALS FROM THE VIEWPOINT OF SUSTAINABLE AGRICULTURE IN SLOVAKIA

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Summary

The range of biodiversity is a factor of system self-regulation, consequently agricultural ecosystems seem to be markedly limited when compared to natural ones. This is best seen in the number of animal breeds raised. High production intensity is also contradictory to the above requirements. Emission of nitrogen by the excreta of animals, mainly cattle and swine, is one of the important issues. Examples are given of possibilities of regulating nitrogen emissions through composition of the feeding rations and the ways of feeding.

Key words: biodiversity, cattle, swine, nitrogen, feeding ration

Rational use of natural resources is based on the principles of sustainable development of which preservation of the genetic resources of living organisms and of the diversity of species in their natural and artificial ecosystems is one of the basic conditions. In consequence of its activities mankind depletes the genetic outfit of organisms and creates simplified ecosystems that lose their natural ability of self-regulation. Thus the range of biodiversity presents a factor of self-regulation of systems. In this respect it has to be noted that in comparison to natural ecosystems agricultural ones are rather restricted. This is mainly true for farm animals. The numbers of species bred can hardly be compared with the numbers of microorganisms or free-living animals. If we reduce the problem for instance to cattle, it will become even more intricate. When considering cattle breeds from the ecological viewpoint we have to issue from the period of domestication, and mainly from the requirements put on the development and properties of utility breeds. Domesticated animals differ from the free-living ones also in that the variability of the latter is much broader and animals of different regions differ from each other in exterior and utility properties. The foundations of modern animal breeding were laid in England in the 18th century. At the beginning of that period diversity decreased once more and in several regions domesticated animals differed less from the free-living forms. The 19th century was characterized by the occurrence of tenths of new cattle breeds and lines. From this it follows that diversity was created by interaction between the environment and man-induced selection which lead to the implementation of certain breeds, the numbers of which were much higher when compared to the free-living forms. Now again we are witnessing a significant decrease in the number of breeds in Slovakia, too. Efforts are being made to markedly change this process also with respect to ecological aspects. The opinion prevails that a greater variety in breeds which can better adjust to the conditions of the environment can more efficiently influence the formation of landscape, environment and thus create preconditions of sustainable agriculture.

These views are partly contradictory to the economic parameters of production dictated by the world market and have an imminent effect on Slovakia as well. Today, intensive cattle farming can not get along with the production of feeds in a certain area (however, here we have great reserves in Slovakia) but is depending on imports, thus getting into direct competition with the consumption of selected foods by humans and having negative consequences to the environment. Voluminous foods are still insufficiently used in the feeding rations of cattle. The production effectivity of the former is low (in milk production often less than 5 kg/animal and day). On several farms we purchase feeds also in cases when we could produce them by ourselves. In 1993 a project was designed to optimize the natural resources of food production in Slovakia which stressed the ecological stability of the agricultural and horti-agricultural landscape. Different levels of cattle unit loads are proposed according to the character of the region: 0.37, 0.41 and 0.54 cattle units per hectare of land in the irrigation, dry and submountainous or mountainous regions, respectively. With this load and with properly grown, protected and dunged crops biodiversity can be substantially increased.

Implementation of these aims in practice is connected with disproportions mainly in the ecological understanding of the process. On one side biodiversity is being supported, on the other side absolute production is being increased with only a small number of cattle breeds. This is closely connected with the economic conditions of production. Nowadays, a successful farmer has to produce consumer-accepted animal products of high quality („Food on hoofs“) that would be competitive on the world market, in a desirable environment. This means that formation of the environment is becoming part of the acceptability of products produced for human nutrition.

Nitrogen release by animal excreta is one of the most important issues from the viewpoint of relations between animal breeding, environment and product quality.

Results of experiments and practical observations carried out at the Research Institute of Animal Production in Nitra showed that *dairy cows* ingested a daily mean of 230–250 g N depending on the type of feeding ration and milk production. In most types of feeding rations an overfeeding with nitrogen substances is encountered which brings about increased excretion of

the latter by urine and faeces. On our farms dairy cows excrete about 75-85 kg N yearly, of which 35-70 % (depending on the feeding ration) are excreted by urine.

Physical modification of feeding rations and doses, application of mixed and calibrated rations, frequency and sequence of feeding can also significantly affect the digestibility, metabolism and excretion of nitrogen.

Comparison of feeding rations containing pulverized and granulated feed mixtures revealed that for instance dairy cows fed granulated mixtures excreted by 24 % less nitrogen with excretion of the latter by urine being significantly decreased.

Different results were observed when dairy cows were fed mixed and calibrated feeding rations. The digestibility of N-substances in mixed feeding rations was increased by 6.5 %.

Nitrogen excretion also depends on milk production. The absolute amount of excreted N increases with the increase in production, however, it decreases by as much as 10 % when re-calculated to 1 kg of milk produced.

Regulation of nitrogen excretion in *growing animals*, mainly feedlot cattle, is a rather complex problem. Positive results can be achieved by decreasing the content of N-substances in the feeding rations when each per cent of decrease enables to reduce the N-output in excreta and urine by about 6-8 %.

Feedlot steers with a live weight of 300-350 kg have a daily intake of 120-180 g N, depending on the type of feeding ration. From this amount they excrete an average of 24-30 kg N per animal and year.

In *swine*, reduction of nitrogen excretion can be achieved mainly by balancing amino acids in the diets. In the present feeding systems for different categories of swine nitrogen retention does not surpass 30 % of the ingested amount. Utilization of nutrients improves with the increasing level of efficiency and the amount of urea nitrogen per kg of product decreases.

Each kilogram of dry matter fed increases nitrogen production in the urea by more than 200 g.

Standardized consumption of nitrogen and multi-phase feeding of fattening pigs can contribute to a decrease in N excretion by more than 10 % when compared to the feeding of universal feeds.

If we combine *protein feeds with synthetic amino acids*, positive results can be achieved in the decrease of nitrogen emission. In practice, a real decrease of N-substances in the feeding rations by 2 % can be counted with.

UTILIZATION OF BIOLOGICAL PREPARATION KOFASIL LIVE AT SILAGING OF GRASS STAND

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Summary

We evaluated the effect of the biological preparation Kofasil Live on the fermentation process at silaging the grass stands. We found out that the silage treated by the preparation showed markedly lower losses of dry matter (8.16% : 14.5 %), higher content of dry matter (28.5 % : 26.6 %) and statistically significantly higher content of crude protein (177.22 g : 174.07 g) compared with the control. The parameters of the fermentation process and lower content of NH₃-N out of total N (4.67 : 11.66 %) were found in the treated silage also.

Key words: silage making, grass stand, biological preparation, bacteria of lactic fermentation

The quality of conserved fodder crops influences decisively the economy of cattle breeding. The grass stands contain to a large extent sufficient amounts of saccharides compared with other species of fodder crops and so is the utilization of probiotics in their conservation relevant.

The use of biological inoculants in silage making can improve the start and course of the fermentation process. The additive of microbial cultures into the silage matter shall provide the start of homofermentative fermentation and speed up and improve the fermentation process.

Material and methods

The aim of the work was to evaluate the effect of biological preparation on the quality of fermentation process in silage made of grass stand. The experiment was performed in operation conditions in the silage pit, in bags 30 x 61 cm. The grass stand composed of 80 % grasses, 15 % herbs and 5 % clover crops was ensilaged. The stand was renewed 6 years ago, and it was heavily degraded during the period of harvest. It was manured with 40 kg P in autumn and 60 kg N in spring.

The control matter was treated with no conservation preparation. The experimental variant was treated with the biological preparation Kofasil Live composed of *Lactobacillus plantarum* 3676 and 3677, *Propionic bacterium* 9576 and 9577, medium. The bags with conserved matter were stored 1.8 m from the surface and 80 cm from the bottom of the silage pit. The bags were removed from the pit 336 days after the beginning of ensilaging and the proportion of weight losses was calculated from the difference between the dry matter weight at the beginning and at the end of storage. The content of nutrients was determined by laboratory methods, pH of extract from silage electrometrically, content of lactic acid and volatile fatty acids by gas chromatography, alcohol and ammonia by microdiffusion method as described by Conway. The content of metabolizable

energy (ME) and nett energy (NEL) were calculated as described by Sommer et al. (1994). We elaborated statistically the results of observations by means of Statgraphics 2.6 programme.

Results and discussion

The content of fibre was higher in the silage stand which was harvested in later stage (table 1). Markedly lower, statistically highly significant losses were found in the silage treated with the preparation Kofasil Live compared with the untreated control. Statistically highly significantly lower pH was also found in the silage treated with Kofasil Live. The content of individual acids was lower in the experimental group except for lactic acid. We found statistically highly significant difference in the content of caproic acid only. The content of NH₃-N out of total N was statistically significantly higher in the control group. The content of alcohol was higher in the control group, too (table 2). We found out that the content of dry matter decreased in both silages. The difference between silages was statistically highly significant. The content of crude protein, energy, fibre and ash was higher in the silage treated with the preparation Kofasil Live. The difference in crude protein and fibre content was statistically significant between the silages (table 3). Gruber et al. (1997) found positive results after application of lactic fermentation bacteria in conserved stands. They point out that digestibility of silages and efficiency of animals improved together with the improvement of fermentation process. Similar results in testing the Kofasil Live give also Žiláková et al. (1997) in pH and content of NH₃-N out of total N. Higher content of nutrients and lower content of NH₃-N out of total N in silage treated with Kofasil Live correspond with the findings of Jonsson et al. (1989) and Kwell et al. (1993) who found markedly lower content of NH₃-N out of total N after the application of the biological preparation, as well as with the results of our previous works Gallo and Sommer (2000).

Table 1 Content of nutrients in ensilaged grass matter

Dry matter G	OM g.kg ⁻¹	DOM DM extract	Crude protein	Fibre	Nitrogen free	Fat	Ash	ME MJ.kg ⁻¹	NEL DM extract
308	923	574	179	348	362	35	76	8,85	5,17

Table 2 Parameters of fermentation process of the produced silages

Parameter n = 6	Control		Kofasil Live		Statistical significance	
	x	s	x	s	P < 0,05	P < 0,01
Losses of dry matter in %	14,52	1,56	8,16	4,16		1 : 2
PH	4,09	0,04	3,96	0,02		1 : 2
Acids in g.kg ⁻¹ dry matter						
- lactic	75,25	5,26	83,21	8,40		
- acetic	20,72	4,12	14,80	5,62		
- propionic	1,96	0,55	1,55	0,27		
- butyric +	1,33	0,27	1,03	0,17		
- valeric +	0,51	0,12	0,43	1,78		
- caproic	1,04	0,33	0,45	0,16		1 : 2
NH ₃ -N out of total N in %	11,66	2,52	4,67	1,74		1 : 2
Alcohol in g.kg ⁻¹ dry matter	1,71	0,52	1,14	0,61		

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Table 3 Content of nutrients in silages

Parameter n = 6	Control		Kofasil Live		Statistical significance P < 0,05 P < 0,01
	x	s	x	s	
Dry matter in g	266,61	0,23	285,92	1,47	1 : 2
Crude protein in g	174,07	0,11	177,22	0,27	1 : 2
Fibre in g	332,44	0,76	344,20	0,49	1 : 2
Nitrogen-free extract in g	368,61	6,88	353,61	8,76	
Fat in g	46,56	0,12	45,79	0,18	
Ash v g	78,31	0,19	78,67	0,16	
ME in MJ.kg ⁻¹ dry matter	9,15	0,02	9,15	0,02	
NEL in MJ.kg ⁻¹ dry matter	5,33	0,01	5,34	0,01	

THE LEVEL OF NUTRITIOUS FEEDING OF COWS ON PASTURES AND ITS INFLUENCE ON SELECTED MILK QUALITY INDICATORS

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Summary

In an experiment with three groups of cows during pasture season selected indicators of technological milk quality were observed in dependence on different level of nutritious feeding of cows. The results confirmed the influence of nutrition (its energetic constituent) on acidifying ability of milk and its solidifying temperature. The type of nutrition influenced values of iodine number. However the level of nutrition in this experiment did not influence rennetability values of milk.

Key words: pasture, nutritious feeding of cows, milk quality, acidifying ability, rennetability, iodine number, point of milk solidifying

Introduction

Under conditions of mountain and submontane regions grass vegetation is the basic component of forage stock. Pasture grass, mainly due to intense cultivation, is rich in nitrogenous components but poor in energy. In relation to the ratio of nitrogenous components to energy it is necessary to consider pasture grass of half-natural type to be exclusively protein forage, which requires additional feeding of cows on pastures by forage rich in energy (KNOTEK et al., 1990, GALLO, 1998). This fact is demonstrated not only by a low effectiveness of basic forage ratio produced on grass matter basis but also by different physiological defects of cows. One of the outcomes is reduced quality of produced milk. In pasture regions we can expect higher urea content and lower content of proteins, non-fat dry matter and lactose. We can also expect more radical development of technological problems during milk processing (HANUŠ et al., 1994, FOLTÝS, 1997). According to SOMMER (2000) the content of nutrients in milk is an indicator of metabolism state of cows, therefore it can be used as a criteria determining quality process of milk production.

The goal of this work was to observe selected indicators of technological quality of milk produced by cows of Slovakian Pinzgau Breed during pasture on the original half-natural grass additionally feed with energetic forage.

Material and methods

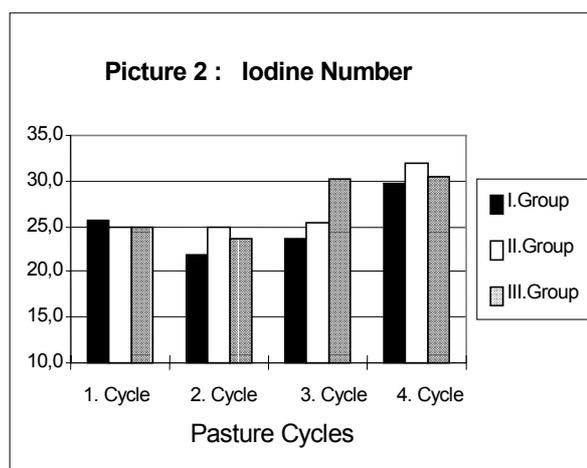
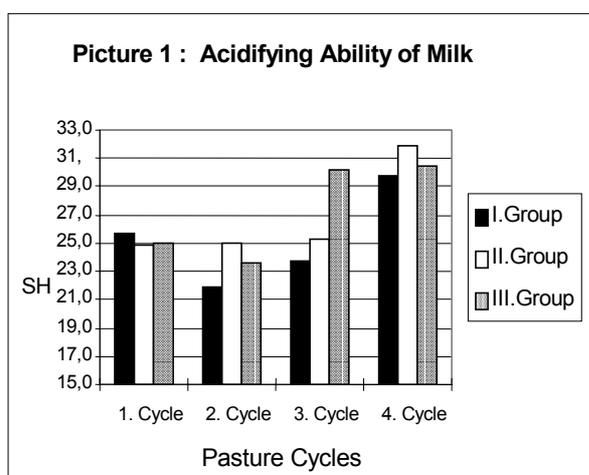
There was eighteen cows of Slovakian Pinzgau breed used in this experiment. They were divided into three groups, each containing six cows according to these criteria: approximately the same yield at the beginning of the experiment, same stage of lactation, number of lactations, minimum range of live weight. Cows were pastured on the original half-natural pastures. Grass dosage was given to cows daily in groups. Pasture season lasted 138 days (May 19 - to October 3). Pasture season was divided

into individual pasture cycles having different duration in dependence on grass growth. Cows on pastures used in this experiment were fed additional energetic forage in the form of brewing malt in these amounts: 1st group (controlling) – without addition, 2nd group - 1,5 kg dry matter/cow per day, 3rd group - 3,0 kg dry matter/cow per day. Brewing malt was fed to cows in half dosages in the morning and in the evening. For each kilogram of milk exceeding yield of 12 kilograms cows were fed grained mixture DOG in the amount of 0,5 kg. During these experiment cows were also fed with mineral forage mixture in the amount of 150 g/cow⁻¹/day¹.

Samples of milk from individual cows were taken approximately in 30 - days intervals. Acidifying ability (yoghurt test), rennetability, iodine number and solidifying point in milk samples was tested. Basic statistic characteristics from measured values were obtained. Values determined in groups were compared by one factor dispersion analysis and differences between average values in individual indicators were evaluated by Scheff ' s test.

Results and discussion

Higher average values of acidifying ability of milk during pasture season were on the contrary to the 1st group with no additional feeding (26,1 ° SH) gained in groups of cows with additional feeding (2nd group - 27,8 ° SH, 3rd group - 27,9 ° SH). This was influenced by the amount of added brewing malt. Course of acidifying ability of milk in individual cycles of pastures (picture 1) also proves that higher values of acidifying ability were gained in groups of cows fed additional forage. Similarly, KADLEC (1998) and GAJDUŠEK (1995) state that lower acidifying ability of milk is mainly due to insufficient energy in forage dosage fed to cows. The influence of additional feeding by energetic forage was more significantly manifested in the 2nd pasture cycle, when statistically provable differences (+ P < 0,05) were found between group without additional feeding (1st group) and groups with additional feeding (2nd and 3rd group).



The level of additional feeding of cows in this experiment did not significantly influence rennetability values of milk. In this case during the whole period of pasture statistically provable differences between experimented groups of cows were not

found. However, KIRST (1985) and PAŽMOVÁ (1992) talk about significant reduction of rennetability in case of insufficient energy and surplus of nitrogenous components. The shortest average time of milk renneting during the whole pasture season was found in the 1st group of cows, followed by 3rd and then 2nd group. Statistically provable differences (+ $P < 0,05$) were confirmed in the 1st pasture cycle between 1st and 3rd group of cows.

The average iodine number values (JĚ) during pasture season demonstrate the influence of different nutritious feeding in individual groups of cows, when the highest value of iodine number (40,5) were gained in cows from the 1st group. Cows of the 2nd and 3rd group gained lower values of iodine number (36,53, and 36,66 respectively). Statistically provable differences (+ $P < 0,05$) were found during the whole pasture season between 1st and 2nd group. Statistically provable differences between these groups were also found during the 2nd pasture cycle. Dynamic changes of iodine number during individual pasture cycles are illustrated in picture 2. But it is evident that higher iodine number values were gained in the 1st group of cows, which was fed only grass from pastures. The results gained are in accordance with KRÉÁL (1990). According to him the fresh mature green forage, meadow grass cause high iodine number value and forage with high fibre content, starch or saccharose cause low values of iodine number. According to ULBERTH (1991) forage components, which support development of acetic acid in rumen metabolism and at the same time they are poor in fat, lead to development of solid milk fat (low iodine number). In case of fresh pasture grass (in dry matter 5 to 10 % of lipids and low fibre content) content of acetic acid decreases.

Normal and appropriate way of nutritious feeding of cows does not have any significant influence on solidifying temperature of milk (TTM). Changes can be observed in case of inappropriately balanced ratio between energetic value of feeding dosage and protein content and mineral deficit (MICHALCOVÁ, 1997, KADLEC, 2000). The gained results correspond with this when average values TTM found during pasture season, as well as in individual pasture cycles were lower in groups of cows with additional energetic forage (2 group: - 0,533 °C, 3 group: - 0,530 °C, or 1 group: - 0, 527 °C). Statistically provable differences between individual groups of cows were not found.

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THE CHOLESTEROL LEVEL OF FATTENERS' MEAT IN DEPENDENCE ON A KIND FAT IN FEED RATION

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Summary

The crossbred fatteners [♀(♀Polish Landrace x ♂Polish Large White) x ♂duroc] from body weight 40kg to slaughtering (103,5kg) were receiving complete mixtures as follows:

- experimental I - control group - without any fat

- experimental II - with 5% of the soya oil with 59,72% content of essential fatty acids
- experimental III - involving 5% the standardised fat with 38,56% content of essential fatty acids
- experimental IV - involving the standardised fat with 27,60% content of essential fatty acids.

In blood plasma of fatteners receiving the soya oil there was termed lower level of total cholesterol and HDL cholesterol and LDL cholesterol in comparison to fatteners of control group. In their ham was termed also lower level of cholesterol (40,8mg/100g tissue) in comparison to fatteners of control group (54,17mg/100g tissue).

In longissimus dorsi muscle of fatteners receiving the soya oil or the standardised fats was termed statistically non-significant decrease in content of cholesterol.

Key words: pigs, soya oil, standardised fat, blood plasma, ham, loin, cholesterol

Introduction

The dietetic value of pig meat depends on the cholesterol level, a fat contain and particularly depends on fatty acids contain. According to Korzeniowski et al. (1992) the level of cholesterol in longissimus dorsi of fatteners depends on breed or crossbreeding scheme. They termed the cholesterol level in longissimus dorsi as follows: Polish Large White - 44,46mg/100g tissue, Duroc - 22,94mg/100g tissue, Polish Large White x Duroc - 24,95mg/100g tissue.

Significantly higher level of cholesterol was termed in fatty tissue (backfat, liver, SADŁO).

The cholesterol level in pig meat depends not only on genetic factors. There are possibilities of decreasing the cholesterol level in pig meat due to correct feeding particularly selecting of feed contained unsaturated fatty acids.

The source of unsaturated fatty acids (which have hypocholesterolemic activity) are oils or seeds of oily plants.

The aim of this study was to term the influence of participation of standardised fat or soya oil in feed ration on the cholesterol level in muscles.

Material and methods

The studies were carried out on 40 fatteners (gilts and barrows [♀(♀Polish Landrace x ♂Polish Large White) x ♂Duroc] dividing into 4 different feeding groups (10 fatteners: 5 gilts and 5 barrows).

They were receiving complete mixture as follows:

- experimental I - control group - without any fat - feeding value: 12,62 MJ EM and 13,32% of digestible protein
- experimental II -with 5% of the soya oil with 59,72% contain of essential fatty acids
(linoleic and linolenic acid) - feeding value: 14,70 MJ EM and 13,93% of digestible protein
- experimental III - involving 5% the standardised fat with 38,56% contain of essential fatty acids- feeding value was the same as the group II
- experimental IV - involving 5% the standardised fat with 27,60% contain of essential fatty acids- feeding value was the same as the group II

Fatteners from body weight 40kg to slaughtering (103,5kg) were fed *ad libitum* with the complete mixture with participation of suitable fat.

After slaughtering the meat samples were taken from the longissimus dorsi (on the dividing line of thoracolumbar vertebraes and loins) and from the muscle of semimembranosus of ham.

The cholesterol level was marked in muscles according to method of sampling given by Rhee et al. (1982).

Three days before slaughtering blood was taken from fatteners. Blood plasma was obtained after centrifuging with speed of 3000 rotations/1 minute per 10 minutes. Then it was kept in temperature -20°C to making analyses.

Results were analysed using the SAS software (SAS/STAT 1989).

Results

The level of essential fatty acids in soya oil was amounted 59,72% and in standardised fat 27,6% and 38,56%. A participation of fatty acids which have neutral or hypocholesterolemic activity was amounted: 10,92; 8,19 and 7,3%. The total cholesterol, HDL and LDL fractions level in blood plasma are shown in table 1.

The ratio of total cholesterol to HDL cholesterol was hesitating from 2,22 (group II - with soya oil) to 2,60 (group III - with the standardised fat 38,56%).

The contain of: total cholesterol, HDL and LDL cholesterol in blood plasma was marked by using equipment of reagents POCH - Gliwice

High level of the essential fatty acids in soya oil decreased the cholesterol level in fatteners' blood plasma.

Then the cholesterol level decreased in loin and ham muscles. In ham of fatteners which received soya oil in complete mixtures - the cholesterol level was significantly lower in comparison to fatteners of control group.

Discussion

The cholesterol level in blood plasma of fatteners remained in physiological norm, which hesitates from 80 to 140mg/dl (Janik et al. 1993).

According to Janik et al. (1993) pigs' reaction to participation of fat in mash depends on breed and genotype of lipoproteides Lpb. All pigs with higher and highest level of cholesterol in blood serum have gene Lpb⁵ or its mutant Lpb⁸.

In own researches there was not analysed the genotype of fatteners. The sire of all the fatteners was the same, but there were different dams.

Busboom et al. (1991) and Barowicz and Pietras (1991) have not termed influence of sex of fatteners on the total cholesterol level in muscles. But Barowicz et al. (1997) giving to fatteners 8% supplement of flax seeds observed statistically non significant decrease of total and LDL cholesterol in blood serum of barrows, whereas differences in gilts' were statistically non significant.

Standardised feeding fat didn't exerted significant influence on explored lipid index of blood serum. Whereas a participation of refined fat in feed rations for gilts caused increasing of cholesterol level in blood serum (Pietras et al. 1996).

There wasn't observed the influence of flax seeds or standardised fat in mashes on the total cholesterol level in longissimus dorsi (Barowicz and Pietras, 1998; Barowicz et al. 1997).

Chichłowska et al. (1995) and Busboom et al. (1991) didn't observed the significant influence of participation of rapeseed meal in mash on the cholesterol level in fatteners' muscles.

Ostoja et al. (1996) giving fatteners mashes with participation rolled grains of rape didn't observed the significant decreasing of total cholesterol level in tissues.

Leszczyński et al. (1992) giving fatteners 10 or 20% full-fat soya meal or tallow didn't termed statistically significant differences of the cholesterol level in longissimus dorsi. While Kouba and Mourot (1991) giving fatteners 4% corn oil from body weight 40 to 100kg have observed statistically significant influence increasing of the cholesterol level in muscles in comparison to fatteners receiving 4% tallow in feed rations.

Borowiec et al. (1998) giving fatteners dried or steamed rapeseeds also have observed statistically significant influence increasing of the cholesterol level in ham muscles.

Chichłowska et al. (1995) and Barowicz and Pietras (1998) suggest that on the limitation of the cholesterol level in muscles and fat higher influence could have the relationship between polyunsaturated fatty acids n-6 to n-3 than general contain of essential fatty acids.

In own researches ratio of fatty acids n-6 to n-3 hesitated from 2,84 (standardised fat 20%) to 6,76 (soya oil).

Summing up the participation of soya oil in mashes for fatteners decreased the cholesterol level in blood plasma and ham and loin muscles.

Table 1. The cholesterol content of blood plasma and muscles of fatteners.

Feeding groups of fatteners	Blood plasma mg/dl			Loin <i>m. longissimus dorsi</i>	Ham <i>m. semimembranosus</i>
	Total cholesterol	HDL - cholesterol	LDL - cholesterol		
I - Control	95,99	40,88	46,71	54,17 ^a	44,33
II - with soya oil supplement	85,94 ^a	38,64	41,51 ^a	40,80 ^b	42,60
III - with 38,56% standardised fat supplement	99,01 ^b	38,04	52,45 ^b	49,80	39,40
IV - with 27,60% standardised fat supplement	85,55 ^a	37,86	41,55 ^a	51,50	43,50
SE	2,64	1,17	2,01	1,87	1,48
Significance different	X	Ns	x	X	ns

a, b - values in the same columns with different letters differ significantly ($P < 0.05$).

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SOME ASPECTS OF INVOLVEMENT AND APPLICATION OF HORMONES, GROWTH FACTORS AND RELATED SUBSTANCES IN ANIMAL PRODUCTION

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Summary

His report represents brief review of original data of authors concerning involvement and application of hormones, growth factors and intracellular messengers of their action in the regulation of reproduction, growth and performance in farm animals. It was shown, that these substances are involved in the control of bovine, porcine, rabbit, nutria and fowl's ovarian functions, as well as of porcine and nutria growth. Furthermore, it was shown, that these hormones can be used for the evaluation of biological activity of stimulators of bovine, porcine, rabbit, nutria, human and fowl's reproduction, for characterisation and prediction of state of porcine and nutria puberty and reproduction, growth, plain of nutrition and meat production, for improvement of biotechnological methods (bovine, porcine and rabbit cell transfection and embryo production), as well as for the direct control of reproduction and meat production rate in farm animals. Finally, our results suggest, that pharmacological regulators of intracellular mediators of hormones and growth factor action can be reliable, cheap and safe alternative to application of hormones in animal production and medicine.

Key words: hormones, growth factors, protein kinase, reproduction, puberty, growth, meat production

Introduction

Hormones, growth factors, growth factor binding proteins and intracellular messengers of their action play an important role in the control of various physiological processes and performance in farm animals. Nevertheless, their effects, mechanisms of action and areas of subsequent applications require further studies. This report represents brief review of original data of

authors concerning involvement and application of these substances in the regulation of reproduction, growth and performance in different farm animal species.

Material and methods

As model objects Slovakian white gilts, Holstein cattles, New Zealand rabbits, domestic nutria and white leghorn hens kept in standard conditions in experimental farms, and their ovaries obtained at local slaughterhouse. Human ovaries were obtained from womens, whose were operated in Nitra hospital. Isolated ovarian follicles, granulosa cells, oocytes and embryos were cultured during 1-12 days with and without different hormones, growth factors, cDNA constructs encoding IGFBP-3 and -4, stimulators and inhibitors of protein kinases listed below. Level of substances in plasma and ovarian cells conditioned medium was measured using RIA/IRMA and ligand blotting, cell proliferation, apoptosis, expression of hormones, growth factors, IGFBPs and intracellular messengers within the cells was evaluated using immunocytochemistry, TUNEL and Western blotting.

Results

Results of our in-vitro experiments demonstrated that production of hormones by ovarian cell cultures can be used for quick evaluation of biological activity of preparations of gonadotropins and other gonadotropic substances used for the induction of superovulation and embryo production in cows and rabbits in vivo and in vitro. This in-vitro approach demonstrated the usefulness of cells isolated from reproductive system for cheap, fast and sensitive evaluation of biological activity, mechanisms of action and safety of hormones, growth factors and drugs.

Results of our further in-vivo and in-vitro experiments suggest that measurement of production of hormones and related substances can be used for characterisation and prediction of physiological state, reproduction, growth and meat production of farm animals. It was observed, that plasma level of thyroid hormones, steroids, nonapeptide hormones, IGF-I, IGFBP-3, cAMP, cGMP, as well as cellular production of these substances and intracellular mediators of their action (protein kinase A, tyrosine kinase, MAP kinase, CDC2 kinase, transcription factor CREB) and indicators of proliferation (p34, PCNA) and apoptosis (TdT, BAX) and their responses to gonadotropic substances is associated with stage of puberty, ovarian folliculogenesis and reproduction rate in gilts and domestic hens. Furthermore, these indexes can be reliable indicators of plain of nutrition in pigs and domestic nutria. It was observed, that plasma IGF-I, IGFBP-3 and thyroid hormone level can be used for characterisation and prediction of growth and reproductive efficiency in pigs.

Other important aspect of application of hormones, growth factors, growth factor binding proteins and pharmacological regulators of intracellular messengers of their action can be use of these substances for regulation of ovarian secretory and generative functions in farm animals in vivo and in vitro. It was demonstrated, that GnRH, gonadotropins, GH, prolactin, serotonin, melatonin, oxytocin, arginine-vasopressin, arginine-vasotocin, IGF-I, IGF-II, TGF, thrombopoietin, analogues of cAMP and cGMP, activators and inhibitors of protein kinase A, tyrosine kinase, MAP kinase, CDC2 kinase can be potent regulators of proliferation, apoptosis, and production of steroid hormones, oxytocin, arginine-vasopressin, arginine-vasotocin, IGF-I, IGFBP-3, inhibin A and B, prostaglandins F and E and related protein kinases and transcription factor by cultured bovine, porcine, nutria, rabbit, human and fowl's ovarian cells. Addition of IGF-I, cAMP and cGMP analogues was able to prevent effect of reduced nutrition on nutria ovarian cells. Transfection of bovine and porcine ovarian cells with cDNA constructs, whose changed expression of IGFBP-3 and IGFBP-4, affected production of steroids, oxytocin and prostaglandins F and E by these cells. Furthermore, addition of IGF-I, IGF-II and EGF were able to stimulate maturation of porcine oocytes and development of rabbit embryos in vitro. Treatment of nutria with GH, IGF-I, forskolin and IBMX (stimulators of cAMP- and cGMP-dependent intracellular mechanisms) stimulated secretion of ovarian hormones and growth factors, enhanced number of ovulations and offsprings, and increased growth rate in females and their pups.

Conclusions

Results of our studies demonstrate, that hormones, growth factors, growth factor binding proteins and intracellular messengers of their action are involved in the control of reproduction, growth and performance in different farm animal species. Furthermore, it was shown, that these hormones can be used for the evaluation of biological activity of stimulators of reproduction, for characterisation and prediction of state of puberty and reproduction, growth, plain of nutrition and meat production, for improvement of biotechnological methods (cell transfection and embryo production), as well as for the direct control of reproduction and meat production rate in farm animals. Finally, our results suggest, that pharmacological regulators of intracellular mediators of hormones and growth factor action can be reliable, cheap and safe alternative to application of hormones in animal production and medicine.

BREEDING AND EFFICIENCY LEVEL OF THE BEEF CATTLE IN CZECH REPUBLIC

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Summary

Dams fertility and beef calves growth were observed in different production regions. Dams in beet-growing region (250-350 m over the sea) had the lowest 1st calving age (875.2 days). The worst results of growth were confirmed in calves in forage crops-growing region (over 600 m over the sea). The live weight at 120 days of age (154 kg) and at 210 days of age (237 kg) were significantly the lowest, so average daily gain. Bulls of beef Simmental had the best growth ability in the fattening (live weight at fattening finish was 728 kg), bulls of Limousine and Angus had the worse growth ability in the fattening (558.8 kg, resp. 569.7 kg).

Key words: cattle, beef breeds, calves growth, production region, fertility, fattening

Introduction

Beef cattle breeding like new line of the cow breeding without milk production have in Czech republic 10 - year's tradition. For this season happened to significant prevalence of registered cows count and extension beef cattle breeds. In the year 2000 was farmed 12 breeds of the beef cattle and total count cows without milk production is estimated 95 – 100 000 (Šeba, 2000). High part of count cows increasing without milk production represented milk cows herds, which in relation to unfavourable milk market development, was redrafted to system without milk production. Beef cattle bulls were interbred with these cows and so was production offspring with beef production initiated.

Breeding of these cows proceeds in different productive conditions and with different breeding results. Cows breeding effectiveness is however influenced by breeding management than breeds (Dufka, 1995). Economic effective is cows breeding without milk production by Poděbradský et al. (1996) and Kvapilíka et al. (1995) only in case of state subsidy, which obtains especially for foothills and mountain regions, where cows is not possible to breed without adequate state support.

Material and methods

Parameters of dams fertility (age of the 1st calving, meantime), of calves growth live weight and daily gains) of beef breeds in individual production region (forage crops-growing region, potatoes-growing region, grain-growing region, beet-growing region) were observed on the Agricultural Faculty of University of South Bohemia.

Parameters of fattening and carcass value were observed in bulls selected pure-bred beef breeds Angus (AA), Limousine (Li), Charolaise (CH) and beef Simmental (MS).

Results and discussion

Expressive reducing of 1st calving age and meantime is evident in parameters of fertility and early maturing of beef cattle dams bred in production regions with better conditions (table 1). The dams in forage crops-growing region and potatoes-

growing region had significantly higher 1st calving age (+67.9 days, resp. 45.9 days) in comparison with average age of dams in beet-growing region (875.2 days). Non significant differences were at length of meantime of dams among the production regions. This fact shows more expressive influence of herd's management on this parameter in comparison with production regions influence. Dufka (1996) recommend the same fact.

Statistically significant differences among production regions were founded in live weight and average daily gains of calves. Calves reared in forage crops-growing region had the lowest average live weight (154 kg at 120 days of age and 237 kg at 210 days of age). Influence of natural conditions is expressive during comparison of average daily gains, too. Average daily gains to 120 days of age was in forage crops-growing region 1008 g, it is about 61 – 69 g less in comparison with other production regions. Average daily gains to 210 days of age was in forage crops-growing region only 971 g, it is value about 113 – 126 g lower than values in other regions (table 2).

Growth ability of bulls of Aberdeen Angus (AA), Limousine (Li), Charolaise (CH) and beef Simmental was evaluated in working experiment (table 3). Simmental bulls had the highest live weight ($P \leq 0.05$ to $P \leq 0.01$) in all fattening phases (342.6 kg at 210 days of age, 598.9 kg at 500 days of age, 728.0 kg at the fattening finish). Voříšková et al. (1998) present, Simmental is on the same level in meat performance as beef breeds. Li and AA bulls had significantly the lowest live weight (558.8 kg, resp. 569.7 kg) in comparison with other groups. Average daily gain during the fattening was from 0.82 kg (Li) to 0.97 kg in CH group ($P \leq 0.05$). Expressive decrease of growth intensity was founded in phase after weaning (in Si group 47.2%). Teslík et al. (2000) recommend, correct management of herd is very important in this phase.

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Table 1 Results of the early maturing and fertility of beef herds bred in individual production regions

Parameter	Region				F - test
	Forage crops-growing over 600 m	Potatoes-growing 400-650 m	Grain-growing 300-600 m	Beet-growing 250-350 m	
1 st calving age (days)	943,1	921,1	869,9	875,2	10,36 ⁺⁺
Meantime (days)	412,7	419,9	403,3	436,9	2,14

Table 2 Average live weight and average daily gain of calves in individual production regions

Parameter	Region				F - test
	Forage crops-growing over 600 m	Potatoes-growing 400-650 m	Grain-growing 300-600 m	Beet-growing 250-350 m	
Live weight at 120 days (kg)	154	165	167	173	25,40 ⁺⁺
Live weight at 210 days (kg)	237	265	270	270	55,96 ⁺⁺
Gain to 120 days (g)	1008	1077	1069	1071	11,35 ⁺⁺
Gain to 210 days (g)	971	1092	1097	1084	44,77 ⁺⁺

Table 3 Growth parameters in individual groups of bulls

Parameter	Breed					F - test	
	AA	Li	CH	CxCH	Si		
Birth live weight (kg)	x	35,0	35,6	40,3	35,9	-	4,23+
	s _x	1,79	3,05	3,86	3,00	-	
	v%	5,11	8,57	9,58	8,35	-	
Live weight of calves at 120 days of age (kg)	x	169,3	177,4	168,3	180,5	182,8	1,26
	s _x	10,65	23,01	17,68	11,21	5,07	
	v%	6,29	12,97	10,51	6,21	2,77	
Live weight of calves at 210 days of age (kg)	x	274,3	294,0	280,7	281,1	342,6	8,64++
	s _x	25,15	30,21	25,55	15,38	3,21	
	v%	9,17	10,27	9,10	5,47	0,94	
Average daily gain from 120 to 210 days of age (kg)	x	1,17	1,30	1,25	1,12	1,78	11,26++
	s _x	0,23	0,28	0,15	0,15	0,08	
	v%	19,56	21,68	11,65	13,05	4,43	
Age of fattening start (days)	x	220,8	257,8	234,8	-	236,4	1,66
	s _x	37,67	10,47	36,50	-	9,94	
	v%	12,53	4,06	15,54	-	4,20	
Weight of fattening start (kg)	x	281,4	308,2	295,0	-	381,0	12,22++
	s _x	20,56	31,52	34,83	-	17,64	
	v%	7,31	10,23	11,81	-	4,63	
Slaughtering age (days)	x	580,8	561,8	582,7	588,5	607,4	2,49
	s	27,67	10,47	25,99	26,88	9,94	
	v%	4,76	1,86	4,46	4,57	1,64	
Slaughtering weight	x	569,7	558,8	633,5	642,6	728,0	4,50++
	s _x	58,89	33,42	109,02	34,26	54,04	
	v%	10,34	5,98	17,21	5,33	7,42	
Average daily gain of fattening Period (kg)	x	0,86	0,82	0,97	-	0,94	2,25
	s _x	0,10	0,04	0,28	-	0,11	
	v%	12,05	4,79	28,98	-	11,51	
Average weight at 500 days (kg)	x	491,9	497,6	563,3	546,8	598,9	3,12+
	s _x	63,09	33,33	87,14	34,15	36,51	
	v%	12,83	6,70	15,47	6,25	6,10	
Average daily gain from 210 days to slaughtering (kg)	x	0,80	0,75	0,87	0,96	0,97	3,73+
	s	0,18	0,05	0,12	0,09	0,11	
	v%	22,47	7,29	13,67	9,07	11,39	
Average daily gain from birth to slaughtering (kg)	x	0,91	0,92	0,96	1,02	-	1,91
	s _x	0,12	0,06	0,11	0,07	-	
	v%	13,51	6,62	11,24	6,51	-	
Net weight gain (g)	x	564,9	582,3	617,6	568,9	663,0	2,40
	s _x	83,38	37,92	84,74	39,35	28,00	
	v%	14,76	6,51	13,72	6,92	4,22	

PRODUCTION OF BREEDING PIGS IN THE BASE OF DAM AND SIRE BREEDS IN THE SLOVAK REPUBLIC

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Summary

Transition to the system of comparative classification and evaluation of carcass pigs emphasize requirements for higher pig meatness. We have studied meat efficiency of both dam and sire populations of pigs bred in Slovak Republic on pigs numbered 1860 pigs altogether in 2000. The dam population on average daily increasing of weight had L - 817 g, BM - 793 g, BU - 786 g, in meat parts percentage LD - 53,42%, BU - 52,77%, BM - 52,74%. In sire population on average daily increasing of weight had DU - 900 g, SM - 805 g, YO - 798 g, PN - 750 g. In CMČ PN - 59.04 %, YO - 56.00 %, SM - 54,64%, DU - 52.32 %. The evaluation of the double - breed combinations in base sire population in the slaughtering parameters had SM x PN the area 57.92 cm², loin bacon 1.45 cm, meat of thigh 24.60 % and CMČ 57,92 %. The present results demonstrate that it is necessary to increase selection of starting breeds for meat content both in the dams and sires population.

Key words: pig breeding, testing of fattening capacity, testing of carcass value.

introduction

The breeding work has an important position at the qualitative production of pork meat. By breeding work we can positively influence quantity and quality of pork meat production.

The breeding and selection in the bred of pigs by its intention follow a systematic decreasing of production costs by improving of fattening and slaughtering parameters.

The control of the utility of pig in the Slovak Republic at present and in the future can we suggest as the most dynamic stage in history of the recording and evaluation of the breeding properties of pigs.

At present for basic parts of activities to acquire the utility properties are performed approx. in 16 % of sows from the total population of pigs in Slovakia.

1 Control of reproduction properties, 2. Field test, 3. Station test, 4. Central filing.

The analyses during the last four years noticed the relatively balanced level in the number of involved sows, in the year 2000 we recorded the increasing trend. Genetic evaluations of pigs by the BLUP method is under preparation already in final phase. The main information system is adjusted to the decentralized collection of data, which enables to use the database in different breeding systems and systems with various structures of database. The programs developed in the frame systems. Will be accessible to everybody via Internet. Slovakia developed a perfect system to acquire, to elaborate and to transmit data on the breed of individual animals, races and population in domestic environs and it is able to connect to Europe systems.

The basic role of tests of fattening and slaughtering value on SVJH (station for fattening and slaughtering value) is to exact estimate of breeding value of parents, tested by point of view of tendency of breeding and to find out variability in the creation of production of marks of single breeds. The directed selection can effectively influence development of specific mark, respectively to increase its variability, as it is published.

The phenotypical and genetical analysis of production parameters of the breeds of pigs in the breeding breeds of Czech Republic was performed by Dufek, Buchta, Ivánek (1987), Matoušek, Kernerová, Pražák (1999), Pour (1999).

In the Slovak Republic to this problems were devoted Flak, Hetényi, Bobček (1997), Biro (1999), Bobček, Řeháček (1999).

The analyse of fattening and slaughtering parameters of breeds and various combinations of crossbreeding in a condition of different countries were found out by a lot of authors Johansson (1982), Ellis and Smith (1979), Luce (1985), Čechová, Buchta, Pražák (1996), Bobček (1999) and others.

Materials and methods

For analysis of production parameters were valued breeds and combinations of crossbreeding, mainly contemporaly used in the Slovak Republic.

The results were processed from all test stations in the Slovak Republic in year 2000. In the methods we used a standards in a charge STN 46 6164 and 46 6450.

The variation and statistical analysis was processed on single parameters of fattening and slaughtering value - by average daily increase of weight from 30 to 100 kg, in a spending of feed mixtures and ME for 1 kilo increase of live weight, for area of MLT in a square centimeters, for a thickness of a loin bacon in centimeters, for percentage of meat parts and portion of meat from thigh.

The representation in 2000 of the single dam and sire breeds was: BU n = 1203, BM n = 280, LD n = 154, SM n = 80, YO n = 68, PN n = 16, DU n = 18 Total n = 1637 pcs.

The double - breed combinations was: BU x L 22, BM x L n = 21, BM x DU n = 17, and base sire breeds SM x PN n = 29, SM x YO n = 85, YO x PN n = 30, DU x YO n = 19, BU x LD n = 22, BM x DU n = 17. Total 223 pcs.

Total representations from all test stations n = 1860 pcs.

Results

The results are in the tables 1 and 2. The valuation of thoroughbred dam and sire breeds is in the table 1. At the valuation of dam breeds on average daily increasing of weight the best value had LD - 817 g, in spending feed of 2,83 kg of feed mixtures or ME for 1 kg increase of live weight 35,65 MJ. The reached the best level in the area of MLD 46,40 cm², at the lowest thickness of bacon 1.64 cm.

The breed LD had at the valuation of percentage of meat parts the highest portion in slaughtery 53.42 % and the biggest percentage of meat from thigh 21.75 %.

At the valuation of sire breeds very good results in the average daily increase of weight had the Duroc (DU) 903 g and Yorkshire (YO) 798 g, at the lowest spending of the feed mixtures DU - 2.71 kg, YO - 2.69 kg. In the slaughtering parameters the best results reached breeds: Pietrain (PN) MLD 54.0 cm², YO - 50.7 cm², lean bacon PN 1.33 cm, YO 1.50 cm in CMČ PN - 59.04 %, YO - 56.00 %.

The evaluation of the double breed combinations the best results reached the combinations in base dam population on average daily increasing of weight the best value had BMx DU 818 g, spending feed mixtures KZ/kg 2.61 kg and ME 32.56 MJ, lean bacon 1.75 cm, meat of thigh 21.58 % and CMČ 53.56 %.

In base sire population on average daily increasing of weight the best value had DUxYO 900g, spending feed mixtures KZ/kg had PN x YO 2.60 kg and ME 32.46 MJ.

In the slaughtering parameters had combination SM x PN the area of MLD 52.0 cm², lean bacon 1.45 cm, meat of thigh 24.60 % and CMČ 57.92 %.

At the comparison of meat efficiency with intention to foreign market, mainly western European countries, where realization is by the meat portions, we must make more intensively breeding work on increasing of portion of meat parts in a slaughtering body of pigs dam breeds and mainly sire breeds.

Table 1 An average values of fattening and slaughtering parameters by single dam and sire thoroughbred breeds in year 2000

BREED	Average increasing of weigh (g)	Spending feed		MLT (cm ²)	Loan bacon (cm)	Meat thigh (%)	CMČ (%)
		KZ/kg	ME/MJ				
Large White	786	2,88	36,22	45,2	1,83	21,36	52,77
White Meats	793	2,95	36,89	44,4	1,88	21,18	52,74
Landrace	817	2,83	35,65	46,4	1,64	21,75	53,42
Slovak Meats	805	2,82	35,45	47,8	1,71	22,51	54,64
Yorkshire	798	2,69	34,23	50,7	1,50	23,65	56,00
Pietrain	750	2,72	35,28	46,0	1,33	26,17	59,04
Duroc	903	2,71	34,84	43,5	1,78	21,07	52,32

Table 2 An average values of fattening and slaughtering parameters by single double - breed combinations in base dam and sire population in year 2000

BREED	Average increasing of weigh (g)	Spending feed		MLT (cm ²)	Loan bacon (cm)	Meat thigh (%)	CMČ (%)
		KZ/kg	ME/MJ				
BU x L	792	2,82	35,79	45,8	1,81	21,25	52,59
BM x L	761	2,83	35,32	44,5	1,73	21,46	53,55
BM x DU	818	2,61	32,56	45,0	1,75	21,58	53,56
SM x PN	736	2,80	35,02	52,0	1,45	24,60	57,92
SM x YO	844	2,74	34,96	48,0	1,65	22,75	54,63
YO x PN	797	2,85	36,15	51,8	1,41	24,13	56,85
DU x YO	900	2,60	32,46	47,5	1,86	21,73	53,72

Legend: BU - Large White, BU - White Meats, LD - Landrace Slovak, SM - Slovak Meats, YO - Yorkshire, PN - Pietrain, DU - Duroc, MLT - musculus longissimus thorasis, % CMČ - lean meat percentage

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RELATIONSHIP BETWEEN CAUSES OF COWS' NEGATIVE SELECTION AND THEIR MILK PERFORMANCE AND EXTERIOR

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Summary

Milk performance, exterior valuation and causes of culling were observed in 188 cows of Bohemian Spotted Cattle and 345 Holstein cows bred in the same conditions in submountains region. The differences between exterior formation all cows in herd and cows eliminated from herd were certified. Bohemian Spotted Cattle cows' selection were lower (30.85%) than selection of Holstein cows (38.84%). The differences between exterior formation of cull cows and non cull dams were founded.

Key words: cattle; cows' exterior; culling

Introduction

The level stayability of cows and causes of their culling from herd is important for permanently tenable agriculture and its economics. SCHAEFFER and BURNSIDE (1974) consider as the most important factors, what influence stayability of cows, milk performance and valuation of type, respective of exterior of dams, too.

The data about lifelong production, milk yield, content of milk fat and proteins and 28 traits of body conformation in 34 322 dairy cows were analysed by KLASSEN, MONARD and JAIRATH (1992) in Canada. Majority of phenotype correlation between lifelong production with traits of exterior was from 0.15 to 0.20, except body capacity, back and legs, what were about 0.07. Genotype correlation were high between lifelong production and angularity ($r=0.44 - 0.55$) and milk character ($r=0.53 - 0.56$).

PUTZ (1995) determine by analysis of valuation of Spotted Cattle exterior in Bavaria, that animals with limbs defect, for example in position of legs, marked joints, defect of pastern and hoofs, have worse production and longevity.

The aim of observation were to found the differences of body conformation cows culling from causes a low production, mastitis, fertility defect, occurrence of difficult calving and the other zootechnician reasons, and non culling cows.

Material and methods

Milk performance, valuation of exterior and causes of culling of 188 Bohemian Spotted Cattle cows and 345 Holstein cows are observed in farm in submoutains region in 1999 – 2000 years. Both races were bred in the same technology (free housing), management and nutrition.

Results

The differences in order of lactation during negative selection and in the estimate breed value for parameters of milk performance in culling dams are in table 1. Average values show, that in this technology, Bohemian Spotted dams are culled oldest than Holstein cows (2.98; resp. 2.33 lactation). Bohemian Spotted cows, culling from causes a low production, have distinctly lowest breed value of individual parameters of milk performance in compare with Holstein cows. This fact shows that the selection of Bohemian Spotted Cattle is stricter and negative selection of the Holstein dams from causes a low production is influenced also other factors.

Fifty eight cows of Bohemian Spotted Cattle (30.85%) and 134 Holstein cows (38.84%) generally were culled in observed herd.

The low value lactation order of Holstein cows culling from causes fertility defect (1.98) shows the frequent culling of cows from cause infertility on 1st and 2nd lactation. It coheres with highest percent of Holstein cows selection in compare with Bohemian Spotted Cattle ones.

Significantly different values of individual exterior traits of dams culling from observed reasons in compare with average value of ones of observed herd are stated in tables 2 and 3 on the grey background. Bohemian Spotted Cattle cows culled from cause low production were more big (6.0 points), with more expressive fleshing (5.86 points), with worse formation of rear udder (4.86 p.), with plain udder centre ligament (2.86 p.) and small depth of udder (6.14 p.). Occurrence of difficult calving is connected with shorter and thinner rump (4.86 and 3.14 points).

Also the probability of Holstein cow negative selection from cause low production is connected with bigger framework (5.37 points), open position of hind legs and more flat hoofs, with better fore udder attachment (6.15 p.), but with worse formation of rear udder (5.15 p.). The difficult calving had relationship with upcast rump of cows (4.46 points).

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Table 1 Average lactation order and average breed values of negative selection cows

Parameter	Breed	Cause of culling					Total
		Low production	Mastitis	Fertility defect	Difficult calving	Other causes	
Lactation order	C	2.14	3.11	2.58	3.63	3.91	2.98
	H	2.23	2.6	1.89	2.67	2.71	2.33
Breed value kg of milk	C	-177	72	-27	127	78	66
	H	-3	75	-1	113	30	58
Breed value % of protein	C	0.02	0	0.02	0.04	0.05	0.03
	H	0.07	0.03	0	0	0	0.03
Breed value kg of protein	C	-6.3	3.75	0.45	6.38	4.73	4
	H	3.27	1.37	0.4	3.6	0.83	0

Table 2 Average values of selection parameters of negative selection cows of Bohemian Spotted Cattle exterior

Traits of exterior (points)	Cause of culling					Average value of herd
	Low production	Mastitis	Fertility defect	Difficult calving	Other causes	
Height in hips	6.00	4.75	4.52	4.43	4.64	4.5
Fleshing	5.86	5.13	5.28	5.14	5.27	5.4
Length of rump	6.00	5.00	5.00	4.86	5.64	5.2
Width of rump	4.43	4.63	3.96	3.14	4.45	3.7
Position of hind legs	4.86	6.25	5.72	6.00	5.73	5.6
Hock	5.57	6.38	6.36	6.71	6.18	6.3
Length of udder	5.00	5.25	5.44	5.57	4.55	5.4
Rear udder	4.86	5.75	5.32	5.57	5.36	5.9
Udder centre ligament	2.57	3.50	4.24	5.43	5.45	4.5
Udder depth	6.14	5.63	5.20	5.57	4.55	5.3
Teats location	4.86	3.75	4.25	4.57	4.00	4.1

Table 3 Average values of selection parameters of negative selection cows of Holstein exterior

Traits of exterior (points)	Cause of culling					Average value of herd
	Low production	Mastitis	Fertility defect	Difficult calving	Other causes	
Size	5.37	4.72	4.85	5.23	4.97	4.6
Rump slope	5.00	4.89	4.87	4.46	4.97	4.7
Position of hind legs	6.00	5.56	5.73	5.69	5.71	5.7
Hoofs	4.08	4.33	4.31	4.69	4.16	4.4
Fore udder	6.15	5.22	5.54	5.62	5.66	5.5
Rear udder	5.15	5.78	5.75	5.69	6.11	6.0
Udder centre ligament	4.15	4.72	4.81	4.92	4.13	4.8
Udder depth	6.69	5.89	6.48	6.38	5.89	6.1
Teats location	4.31	4.17	4.37	4.54	4.45	4.4

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THE POLYMORPHISM OF PRNP GENE IN CATTLE

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Summary

The PRNP gene frequency of the allele 6 : Czech pied cattle =0,92 (113 heads); Black and white cattle = 1,00 (10 heads); Pinzgau cattle = 1,00 (13 heads); Charolais cattle = 0,93(29 heads);. The homozygous genotype of PRNP 5/5 was find only in the set of Czech pied and Charolais cattle. The gene frequency of the allele PRNP 6 in gene reservation stocks were: Czech red cattle = 0,95 (64 heads) and Polish red cattle = 0,91 (63 heads). The breeding value for milk production was higher in homozygous Sires of the genotypes PRNP 6/6 in comparison with heterozygous Sires PRNP 5/6.

Key words: PRNP gene, alleles frequency, cattle, breeding value

Introduction

The neurodegenerative disease – bovine spongiform encephalopathies (BSE) in cattle, the scrapies in sheep and Creutzfeld-Jacobs disease in humans is due to aberrant form of prion protein (PrP). This protein is sialoglycoprotein with molecular weight 27 – 30 kDa. According to various mammalian species it contains 250 – 260 aminoacids(AMA) (picture 1). Polymorphism in the third exon of the PRNP gene is created by three different alleles. They are marked as 5, 6 and 7 due to number of repeats in oktapeptides repetition in the prion protein. Alleles frequentation in various breeds of cattle are proved since half 90 - ties. Niebergs et al. (1994) found gene frequencies for the allele 6 in threere breeds of cattle: Holstein = 0,88 (94 heads), Brahman 0,95 (40 heads) and Brangus 0,95 (40 heads). Schapfer et al. (1998) described frequency of the allele PRNP 6 = 0,85 (72 heads) in the breed of Swis brown. Only in this breed was found allele 7 in very low frequency. Recently Premzl et al. (2000) described frequency of the allele 6 in original Croatian breeds and other breeds, following: Simental 0,97 (70 heads), Holstein-Friesian = 1,0 (9 heads), Istrain 1,0 (22 heads), Slavonian Syrmian = 0,63 (12 heads). Vrtkova et al. (2001 a, b) studied gene frequency in Czech republic in the stocks of gene reserve Czech red cattle as well as Polish red cattle. In this work we would give an information on PRNP gene polymorphism and association of different genotypes of Sires to their breeding value.

The prion gene in cattle is localised at 13 chromosome (Schäpfer et al., 1998). The structure of the prion gene is described by Horiuchi et al. (1998) pict. Nr. 2). The informations on prion protein are immersed in third exone and cover 4 244 bp.

Rank of AMK:	2	3	4	5	6	8	17	21	31	92	95	97	112	138	143	155	
cattle		V	K	S	H	I	S	M	V	G	G	T	G	V	L	S	H
sheep		V	K	S	H	I	S	M	V	G	G	S	S	V	L	N	Y
man		A	-	-	N	L	C	T	L	-	-	T	S	M	I	S	H
		166	168	184	186	203	205	219	231	237							
cattle		V	Q	V	E	I	M	Q	A	I							
sheep		V	R	V	Q	I	I	Q	A	I							
man		M	E	I	Q	V	M	E	-	-							

Figure 1 There is shown the differences in aminoacids composition of the prion gene of cattle, sheep and man. The aminoacids (AMA) are marked by oneletter code.

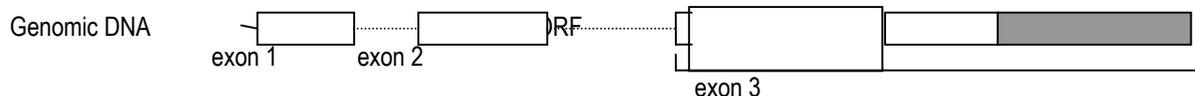


Figure 2 Scheme of the PRNP gene structure

Material and methods

DNA was isolated from the blood or hair bulbs of cattle according to Dvorak et al. (1999). The conditions for PCR, and sequencing of DNA were taken from Premzl et al.(2000). The product of PCR was analysed by 3 % agar gel electrophoresis. The shorter fragments DNA (349 bp) correspond to the allele PRNP 5, longer ones (373 bp) to the allele PRNP 6.

The tested set of cattle was composed of: 113 heads of czech pied cattle, 10 heads of Black and White (Holstein), 13 heads Pinzgau cattle, 29 heads Charolais, 63 Czech red cattle, 63 Polish red cattle. The breeding values for milk production of Sires were obtained from the records of milk production tests.

place of immersing PCR products

separation of the PCR products according to their size

Genotypes of PRNP

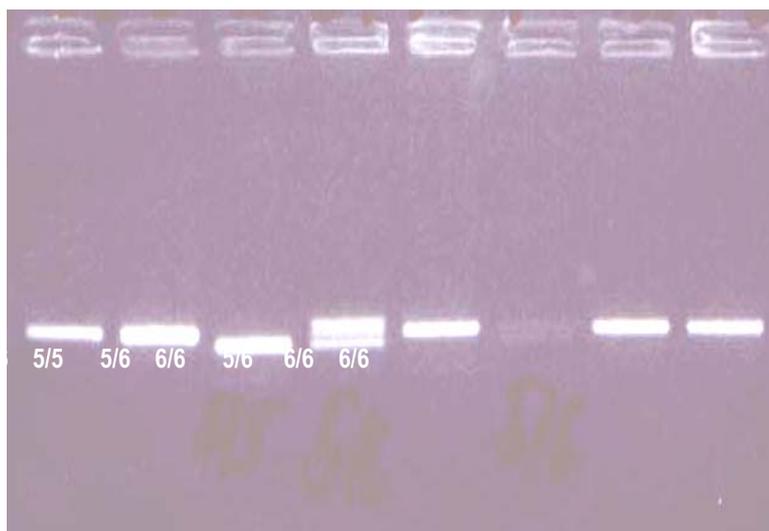


Figure 3. Result of electrophoretic separation PCR products from 3rd exon of the PRNP gene. Slower migrating products = 373 bp is allele PRNP 6, quicker migrating product = 349 bp is allele PRNP 5.

Results and discussion

There was identified three very often presented genotypes of PRNP: 6/6, 5/6 and 5/5 in the tested sets of cattle. The result of electrophoretic separation of PCR products with marking of genotypes PRNP is visualised on the picture 3. Frequentation of genotypes and alleles found in various breeds of cattle in Czech republic, Slovak republic and in Poland are presented in tables 1 and 2.

Tab. 1 The frequency of genotypes and alleles in the breeds of cattle in Czech and Slovak Republic

Breed of cattle		n	Genotypes PRNP			alleles PRNP	
			6/6	5/6	5/5	6	5
Czech spotted cattle in CR	total	113	96 84,96%	16 14,16%	1 0,88%	0,92	0,08
	Sires	66	57 86,36%	8 12,12%	1 1,52	0,92	0,08
	dairy cows	47	39 83,0%	8 17,0%	0	0,91	0,09
Black and white cattle in CR		10	10 100%	0	0	1,00	0,00
Pinzgau cattle (Slovakia)		13	13 100%	0	0	1,00	0,00
Charolais cattle (Slovakia)		29	26 89,6%	2 6,9%	1 3,5%	0,93	0,07

Tab. 2 The frequency of genotypes and alleles of PRNP gene in the gene reserves in Czech Republic and in Poland

Country	Breed	n	Genotypes of PRNP			Alleles of PRNP	
			6/6	5/6	5/5	6	5
Czech rep	Czech red cattle	64	57 89,06%	7 10,94%	0	0,95	0,05
Poland	Polish red cattle	63	51 80,95%	12 19,05%	0	0,91	0,09

We evaluated the Breeding values in the group of Sires homozygous genotype PRNP 6/6 and compared it with those of the heterozygous genotype 5/6 in the set of Czech spotted cattle. Obtained data are summarised in the table 3.

Tab. 3 The breeding values of Sires with homozygotic and heterozygotic genotypes of the PRNP gene.

Sires	n	BV milk kg	BV fatt %	BV fatt kg	BV proteins %	BV proteins kg	RBV proteins kg
Total	30	204,58	-0,13	2,65	-0,026	7,68	93,38
according to genotypes							
5/6	10	110,70	-0,075	1,30	-0,068	3,20	86,60
6/6	20	298,45	-0,185	4,00	0,016	12,15	100,15

Because low number of the Sires, presented data are only informative

It was proved, that certain genotypes of the PRNP gene are resistant to neurodegenerative disease in mice, sheep and man. Up to date such prove was not described in cattle. The association among different variants of PRNP gene and occurrence BSE are presented in the work of Goldman et al. (1994). They found two animals with BSE and all were with homozygous genotype 6/6. Neibergs et al. (1994) tested 56 animals with BSE disease and they identified 84 % with genotype PRNP 6/6 and 16 % with genotype of PRNP 5/6. They did not find any animal among infected animals with genotype of PRNP 5/5.

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OESTRUS INDUCTION AND SYNCHRONIZATION IN SHEEP DURING MILKING AND INCREASED OCCURRENCE OF EWES LAMBING TWINS

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Summary

The aim of this work was to verify the possibilities of inducing fertile oestrus in Slovak Merino ewes during spring lactation by means of a progesterone-based preparation of Slovakian origin. We strived to provide the breeders with an effective possibility of increasing ewe fertility and milk lamb production for the pre-Christmas market. Between May and November two flocks of Slovak merino ewes were observed. On May 2nd, fourteen rams were introduced for 8 weeks into Herd A comprising 350 un milked ewes (control animals). The experimental herd (herd B) comprised 150 milked ewes. These animals were treated with vaginal sponges containing 50 mg progesterone in microcrystalline water suspension (Agolutin-Depot, Biotika a.s.). After 12 days the sponges were withdrawn and the animals received 500 IU PMSG (SERGON inj. a.u.v., Bioveta Ivanovice na Hané, Czech Republic). On day 2 after tampon withdrawal 6 breeding rams were placed in the herd for 35 days. From the results achieved it follows unambiguously that the biotechnical method employed can help to intensify reproduction (20% occurrence of twin births) in sheep herds in the milking period. The finding is original in that using an ecologically clean progesterone-based preparation positively influenced reproduction during the lactation period.

Key words: lactation, ewes, oestrus induction, twin lamb.

Introduction

It is known from our previous results that biotechnical procedures of oestrus induction and synchronization in sheep during off-season physiological anoestrus can be effectively used to solve the problem of low herd fertility rates (MARAČEK, 1995, MARAČEK a kol., 1989, 1991,1995). Nowadays, when the purpose of sheep production is undergoing transformation, milk lambs are required not only by the pre-Easter but also by the pre-Christmas market (MARAČEK, BÍREŠ, 1999, MARAČEK, HENDRICHOVSKÝ, 1994, MARAČEK a kol., 1991, 1995).

Oestrus induction and synchronization is a biotechnical method usually employing pharmaceuticals to induce fertile oestrus in a herd of a given size off the mating season, during anoestrus (in the conditions of t his country usually in the spring) and at a pre-determined time (GAMČÍK, HARTWIGH, 1988, MARAČEK a kol., 1989, 1995).

It was the aim of this work to verify the possibility of inducing fertile oestrus in Slovak Merino ewes in the spring, during the milking period, using a progesterone-based preparation of Slovak provenience. We seeked to provide the breeders with an effective possibility of increasing sheep fertility and producing milk lambs for the pre-Christmas market.

Materials and methods

The observations were carried out in May in two herds of a Slovak Merino ewe breeder. Into Herd A counting 350 unmilked animals (control herd) fourteen rams were placed for 8 weeks on May 2nd. Herd B (experimental one) counted 150 ewes milked for the production of lump sheep cheese. These animals were treated with vaginal sponges injected with 50 mg progesterone in microcrystalline water suspension (Agolutin-Depot, Biotika a.s., Slovenská Ľupča, Slovakia). On May 5th, the tampons were inserted for 12 days by a special applicator. After tampon withdrawal on May 17th each animal of Herd B was given 500 IU PMSG i.m. (SERGON inj. a.u.v., Bioveta, Ivanovice na Hané, Czech Republic). On the second day after tampon withdrawal 6 breeding rams were placed into Herd B for 5 weeks. At the time of tampon withdrawal 9 and 2 ewes were stated to have lost the sponges and to have aborted, respectively.

On November 20th, the results of reproduction were determined on the basis of the breeder's records. For statistical evaluation the chi-square test (χ^2) was used (ČERVENKA, 1975).

Results and discussion

The results of oestrus occurrence, mating, lambing and fertility rates are summarized in Table 1. From the latter it is evident that in the control herd of unmilked and untreated sheep (Herd A, n=350) reared in a chalet without adjustment of the light regime 125 animals (i.e., about 35.7% of the herd) came into heat and were mated after 14 rams had been placed in the herd. In Herd B, in which the animals were treated with progesterone-containing vaginal sponges in combination with extrapituitary gonadotropin PMSG, 128 ewes came into heat and were mated, presenting 85.3% of the treated animals. The difference observed between Herds A and B was significant at $\chi^2 = 51.47$ and $P < 0.001$ with $P = 0.001$ at $\chi^2 = 10.83$. When comparing Herds B and A, fertility was statistically significantly improved in the former at a similar level ($P < 0.001$ at $\chi^2 = 99.25$). The markedly increased occurrence of multiple pregnancies, mainly twins (20%) after the induction of oestrus in lactating deserves a highly positive rating. In Herd B, twin occurrence reached almost 23% whereas in Herd A it was only 5.8%. It is the level of multiple pregnancies that is the determining criterion of the natality rate expressed as the number of lambs born per 100 ewes. In our case natality rates reached 126.4 after the induction of oestrus in lactating ewes (Herd B) and 105.8 in the untreated unmilked controls (Herd A). Lambings took place between October 13th and November 14th, with 87.3% of ewes lambing until October 29th.

Table 1 Selected reproduction indices in two Slovak Merino herds

Index	HERD			
	A- control		B - experiment	
	A	%	A	%
Sheep observed	350	100,0	150	100,0
Sheep treated	-	-	150	100,0
Sponges lost	-	-	9	6,0
Sheep mated	125	37,5	128	85,3
Occurrence of abortions	6	4,8	2	1,7
Lambing – fertility	104	29,7	110	73,3
Lambs born	110	-	139	-
Fertilization – fecundity	-	31,4	-	98,6
Lambs per 100 lambings – natality	-	105,8	-	126,4
Ewes with 1 lamb	98	94,2	85	77,3
Ewes with 2 lambs	6	5,8	22	20,0
Ewes with 3 lambs	-	-	1	0,9
Ewes with 4 lambs	-	-	2	1,8
Lambs dying until Day 14 after birth	11	10,0	14	10,1

Of the results presented it follows expressly that the biotechnical method used can contribute to the intensification of reproduction in our sheep herds (MARGETÍN, 1996, MARGETÍN a kol., 1996). The finding is original in that treatment using an ecologically clean progesterone-based preparation (and not a synthetic gestagen prohibited because of possible residue occurrence) oestrus induction is also possible in the period of milking and lactation after cessation of the puerperium if a proper feed base can be provided. It is also important that a verified biotechnical procedure was employed in animal selection, thus helping to objectivize culling: testing of functional abilities of the sexual organs enables to lay open irreversible

defects of the genitals. Our results also point at increased lambing rates which are expressed in an increased percentage of ewes giving birth to two or more lambs, i.e., in an increased number of multiple pregnancies (GOODMAN, 1998). On the basis of the results achieved this method can be recommended for use in sheep herds in order to decrease the numbers of non-pregnant empty animals, to increase the occurrence of multiple pregnancies and to select ewes with lasting functional disturbances of genitals, i.e., to objectivize the culling procedure.

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THE DEVELOPMENT OF HARE POPULATION (*LEPUS EUROPAEUS*) IN WEST SLOVAK LOWLAND

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Summary

According to the official Hunting statistics, the actual stock numbers of hares fluctuate about 182956 individuals (minimum 169700 in 1997 and maximum 194616 in 1998) in the Slovak Republic in the past 10 years. If the given data are correct, it can be stated that the population density is stable. However, the actual stock numbers of hares are 60,74 % of standardized stock numbers only. Rapid decline (48.7 % during past 10 years) is registered in the hare production (max 63836 in 1990, min 16639 in 1996). Counted from the official statistics, 1 female from the spring stock produced 0.7 young hares in the bag in 1990, but in the period 1997-99 0.3 ones only. Correlation coefficient between spring numbers and the bag is very low (0.0979). Hunting plans for all game species are prepared every year. The plan of hare bag was fulfilled in 1990 only (111%). During monitored period, real number of shot hares represent only 83% of planned amount (in 1996 the real production was only 37 % out of the plan).

According to the bag analysis from selected sites, the increment of hares (expressed in % of young hares in the bag) is 51.07 % (min. 40.77 in 1993, max. 68.76 in 1997), what confirms the theory of stable populations. Reproduction coefficient R (expressing number of young hares per 1 adult in the bag) was 1.13 on average (min 0.76 in 1993, max 2.20 in 1997). Reproduction factor r (expressing number of young hares per 1 female in the bag) was 2.51 on average (min 1.75 in 1998, max 5.7 in 1997). The year 1996 was characterized by extremely bad climate conditions (cold winter with long-term snow cover, cold and wet summer), what caused drastically decline not only of young hares, but adult as well. During hunting season we did not gain any samples and we did not count the parameters of population dynamics. The big reproduction potential is expressed in 1997, when all monitored parameters gained high values, next year after population failure.

Key words: hare, *Lepus europaeus*, Slovakia

Introduction

Stock numbers of the brown hare population (*Lepus europaeus*) and its recruitments are subject to various influences all the time. The most hares were caught in Slovakia during the years 1933-36 (on average 243 726 animals annually), and then during the years 1973-74, i.e. in the conditions of intensive large-scale "socialistic" agriculture (on average 342 866 animals per year). We noticed deep decrease in stock numbers and in recruitment in 1975, however, in 1976-77 shot the hunters

again more than 250 000 hares, which was certainly a great mistake after the great decline in the population in the preceding year because since 1978 began even deeper decline in the stock numbers of this game and the bag stagnates on a very low level nearly two decennia. In the spring stock number (SSN) of hare population in Slovakia there are two decreases in the years 1994 and 1997 since 1990. The second one was unambiguously caused by unfavourable climatic factors in 1996, during which the number of the whole population decreased markedly. In this year somewhat more than 16 ths. individuals were hunted, which is the historical minimum in Slovakia. The whole year 1996 was very adverse to small game. The climatic conditions were unfavourable during the great part of the reproduction season, the youngs of hares were exposed to rain and cold all the time. The autumn was also cold and rainy, it created suitable conditions for development of illnesses and so a part of the youngs which survived the summer deceased during this autumn. The spring populations regenerated quite well after that period, and they achieved the highest number for the last decade in 1998-2000, but he bags did not achieve even the values from the period 1987-95. If the data about the spring populations are reliable then it is a promising fact for the development in the hare population in spite of the average value of SSN being only 61 % of the standardised stock numbers. However, to fill them should the numbers of hares increase approximately by one hundred thousand individuals, which is not possible at present.

PRODUCTION OF HARES

While in 1990 one female from the SSN produced in bags or at catching 0.7 hare, which is a very low value itself, this number decreased during the following years and recently must three females bear the whole year long to realise one young in the bag. The bag of hares after decrease in 1996 was able to regenerate from this critical year (production 0.2 hare per one female out of SSN) only to 0.3 hare per female from the spring stock. This value, being only for the sake of orientation, demonstrates the decrease of production during the last decennium. The production per one female is approximate only as the hares are not hunted in many places at all and many caught are not mentioned in the statistics (they are not mentioned by hunters or they are poached). Planned and real bag of hares In the period since 1987 was the plan of hare hunting performed to 88.6 % only. It was performed in the years 1988, 89 and 90 only (it was performed to 112.9 %). Since 1991 it was performed not even in one year (it is performed to 79.8 % only for this period). The greatest discrepancy between the plan and the reality was in 1996, when only 37.1 % out of the planned hares were caught. The presented results demonstrate the mistakes in planning. It was influenced also by very early term of submission of these plans in previous years. If the plans are submitted too early they cannot take into account the mortality of individuals to the period of catching. However, it was changed in the decree already and we hope it will diminish the disproportions between the plan and hunt. From the presented follows further that planning is not done on the basis of the game census before hunting but presumably merely by estimate. Recruitment of hares and bag of hares and foxes There is apparent discrepancy between the increment of hares and proportion of their hunting which proves that the hunting is not planned correctly. The disproportions began to appear in 1989 when the increments started to decline and hunting increased steadily. It is the most marked during the years 1990 and 1991 when the proportion of hunting was too high and the increments low. The increase in number of hunted foxes meant decrease in increment of hares in hunting grounds and vice versa, in years when less foxes were hunted the increment of hares rose. In 1996 was the decrease in number of hunted foxes caused by adverse conditions. We studied the bag of hares and foxes on the whole territory of Slovakia during the last 25 years and we found out the highly significant negative correlation between these values (0.7583⁺⁺). It proves the marked effect of this predator on the hare population. Parameters of population dynamics We participated in hunts organised in 25 hunting grounds of south-western Slovakia. We analysed the age and sex in more than 4 thousand individuals. The age was assessed on the basis of dried eye lens weight which we consider to be the most reliable method although it time and labour demanding (Slamečka et al., 1997). The analysis of parameters of population dynamics in hares is given in table 1. The proportion of young hares in bag (PYB) varied from 40.8-54.5 % to 1995. The low value of PYB in 1993 manifested itself in the decrease of spring stocks in 1994, however, with regard to good increment in 1994 was PYB stabilised again. We gained no data about the development in population from 1996, as most associations did not hunt the hares and therefore is this column in table 1 empty. After that year is evident a high value of increment again. It is expressed by the proportion of youngs in bag (almost 69 %). Since that year fluctuates PYB around 50 % which means that in the population is about one half of young individuals and their number changes neither upwards nor downwards. It is confirmed also by the value of the reproduction coefficient which gives the proportion of young and adult hares in bag and which is for the whole period only slightly higher than 1.0 (the proportion of young and adult individuals in the population is equal). The value of reproduction factor is interesting. It gives the number of young hares per one adult female in bag and it shows that in the localities, in which the population was studied, was the increment per one female much higher (2.23 youngs) than in the whole Slovakia. The entry from 1997 is worth noticing again, when the rate of increment was high after 1996 and in the bag came up to 5.7 that year's hares to one female. The sexual index, which expresses the proportion of males and females, fluctuates permanently around 0.50. It means that the proportion of sex 1:1 is kept, with very slight superiority of females (0.51) which is confirmed also by literary data.

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Table 1 Parameters of population dynamics in hares from selected localities of south-western Slovakia localities totally

	1987	1988	1989	1990	1991	1992	1993	1994
Localities	14	15	19	8	5	8	5	4
n	1451	1563	1593	977	491	686	474	394
PYB	49,2	57,73	55,2	44,52	48,27	51,31	40,77	54,48
R	0,97	1,37	1,23	0,85	0,95	1,25	0,76	1,2
r	1,86	2,48	2,37	1,99	2,03	2,65	1,82	2,51
SI	0,52	0,51	0,52	0,481	0,497	0,519	0,515	0,5

continuation of table 1

	1995	1996	1997	1998	1999	2000	Total (1987-2000)
Localities	5	-	2	2	3	3	37
n	391	-	141	193	177	237	8768
PYB	52,42	-	68,79	47,64	52,54	49,37	51,68
R	1,13	-	2,204	0,911	1,107	0,975	1,07
r	2,46	-	5,7	1,75	2,21	1,983	2,23
SI	0,502	-	0,52	0,52	0,51	0,498	0,51

PYB - proportion of young hares in bag, R - reproduction coefficient, r - reproduction factor, SI - sexual index.

EFFECTIVITY OF PREVENTION AND CONTROL IN MASTITIS CAUSED BY ENVIRONMENTAL PATHOGENS ON A DAIRY FARM WITH STANDARD ANIMAL CONCENTRATIONS

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Summary

In this work the effectivity of methods of mastitis prevention and control in reducing the occurrence of mastitis caused by environmental pathogens is described in a herd counting a mean of 220 dairy cows. At the start of the experiment 3 complete examinations were carried out. They revealed 38 dairy cows to have clinical mastitis, 84 to have a positive NK-test and 123 to have an infected mammary gland (*S. agalactiae*, *S. aureus*, beta-haemolytical *Streptococci* and environmental pathogens in 31, 3, 1 and 88 cases, respectively). Intramammary cephalosporine treatment of 123 animals with udder infections was unsuccessful in 23 cases; these animals were eliminated and treated repeatedly. After treatment, the quality of the milk produced increased substantially (BT SCC under 400,000 per ml). This favourable condition could be maintained for 5 months after treatment. Afterwards, in consequence of omitting the antimastitis methods or the undue application of the latter (mainly in the field of hygiene) the number of cows with udder infections increased and reached about 78 – 88 animals towards the end of the observation period. However, this had no effect on the quality of the milk produced which still fulfilled the quality parameters required by the standard.

Key words: mastitis, dairy farm

Introduction

Increasing economic effectivity of milk production urges producers to constantly eliminate unreasonable costs. From this point of view mastitis is an important factor decreasing production profitability. Most cases of mastitis are due to an infectious agent. The basic principle of effective mastitis control is to reduce infection sources and transmission ways of the main mammary gland pathogens.

Due to the basic classification of mastitis agents two sources of infection are recognised:

- the milk gland infected with mastitis-causing agents, and
- the infected environment.

The so-called environmental pathogenic bacteria, designed as such because their source is

to be found in the environment where they survive and reproduce extremely quickly, are becoming the predominant pathogens of the mammary gland. Particularly the so-called environmental Streptococci (*Enterococcus* spp. *Streptococcus uberis*) and coliforms (mainly *Escherichia coli*) fall into this category.

It was the aim of this work to determine the effects of treatment of all animals on a farm who excreted bacterial agents of mastitis and of the subsequent introduction of antimastitic methods upon the quality of milk produced.

Materials and methods

The observations were carried out in a herd of 223 dairy cows chain-tied in two production stables on mid-long stances with litter (straw). In both stables milking was done on the stance into a pipeline. In the dry period, during parturition and the dairy cows are placed in a delivery parlor. For milking, the DZ 100 milking installation is used. After analyzing the causes of the unfavourable situation the hygienic shortcomings were eliminated, biotechnical control II was implemented, and since then a hygienic program of milking and of post-milking teat insertion into a 500 ppm digluconate chlorhexidin disinfectant solution has been carried out. Disinfection of the milking equipment is done according to valid standards with preparations containing 200 ppm chlorine. Non-selective treatment of the mammary gland by antimicrobials at the last milking – DCT (dry cow therapy; Vasil', 1988) with Cefa-Dri (Fort Dodge, USA) was introduced. In March 2000 the mammary gland secretions of all dairy cows in the herd were examined for pathogenic udder bacteria 3 times in 14-day intervals. The bacteriological examinations were amended by the NK-test and clinical examination of the health state of the udder. Based on the results of the three bacteriological examinations (IDF Bulletin, No. 132, 1981) all animals excreting bacterial agents of mastitis underwent treatment (Vasil' et al., 1993). Gamaret (Infuza, Czech Republic) was used to treat lactating cows. Treatment-resistant animals were re-treated with Cefa-Lak (Fort Dodge, USA) according to the manufacturer's recommendation. The effectivity of all measures was estimated in monthly intervals by complex udder examinations including NK test of the secretion, clinical examination of the mammary gland (IDF Bulletin, No. 211, 1987) and bacteriological examination of secretion samples. The antibiotic sensitivity of each causative agent to 10 antibiotics was tested by the agar-diffusion test using standard antibiotic disks according to the method of Urbašková et al. (1985).

Results and discussion

In Table 1 the results of complex examinations carried out during the 8 months of observation are given. Prior to our intervention the farmer himself was providing for control and treatment of secretory damage of the mammary gland. He did not keep to the principles properly so that the numbers of somatic cells in pool samples of milk were gradually increasing and in March 2000 reached 780,000 BT SCC per 1 ml mil. At the initial bacteriological examination 123 dairy cows of 214 were positive which presented an infection level of 57.5%. In the NK-test 84 of 172 lactating animals proved to be positive; of the former 38 were clinically diseased. The bacteriologically positive 98 lactating and 25 dry-standing dairy cows were intramammary treated with Gamaret (Infuza, Czech Republic) and Cefa-Dri (Fort Dodge, USA), respectively. In this way the number of bacteriologically positive dairy cows was reduced to 23 (infection rate 10.9%), the frequency of positive reactions to the NK-test to 17.8% (28 positive animals) and clinical mastitis was only seen in two animals. The situation kept on till July when it worsened in all indices under observation. In September 2000 we already observed 88 bacteriologically positive dairy cows (infection level 39.8%), 55 animals with a positive reaction of milk to the NK mastitis test (26.8% of lactating animals) and 12 had clinical mastitis. With smaller changes this situation persisted also in October and November. In March 2000, high numbers of somatic cells were counted in pool samples of milk (780,000 BT SCC/1 ml). The actions taken at the end of March and beginning of April 2000 lead to a decrease so that the control examination in April revealed 259,000 BT SCC/1 ml. This level was retained till the end of the observation period with the exception of September when 411,000 BT SCC were counted per 1 ml. In the individual months, 85 to 95 % of all lactating cows were producing milk for public consumption.

Table 1 Results of complex examinations during 8 months of observation of mastitis infection rates on a dairy farm

Month of examination	Number of dairy cows examined		Number of positive dairy cows			BT SCC/ml in thousands
	by NK-test and clinically	bacteriologically	clinically	by NK-test	bacteriologically	
March	172	214	38	84	123	780
April	177	210	2	28	23	259
May	134	215	3	24	26	320
June	174	221	2	27	21	295
July	173	214	4	29	32	365
August	185	220	10	48	59	395
September	205	221	12	55	88	411
October	176	205	14	52	83	390

November	173	204	11	49	78	378
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The results document the preventive and control measures associated with environmental pathogen-caused mastitis to have their specific features. Mammary gland health can be maintained on a level that ensures production of milk of desired quality, however, under demanding conditions since the interactions of the biosystems concerned (dairy cow – environmental pathogens – environment) are not yet fully understood.

In Table 2 the level of bacterial agents in mastitis infection rates is given for the herd under observation. In March 2000, complex examination revealed the following shares of causative agents: *Streptococcus uberis* (71 animals), *Streptococcus agalactiae* (31), coagulase-negative *Staphylococci* (16), *Staphylococcus aureus* (3). Beta-haemolytical *Streptococci* and *Enterococcus* sp. were each found in one animal. Of 123 bacteriologically positive dairy cows treated with Gamaret (Infúza, Czech Republic) 81.3% were restored to health. In April 2000, twenty-three resistant cows were treated with Linkomicin F (Lek, Slovenia); of these 8 revealed persisting agents (*Streptococcus uberis*, coagulase-negative *Staphylococci* and *Staphylococcus aureus* in 5, 2 and 1 animal, respectively). These animals were gradually culled. During May and June 2000 the occurrence of bacteriologically positive animals did not change substantially, however, isolation of *Streptococcus agalactiae* in 3.7% of the animals between April and November 2000 was a substantial finding. According to Table 2 the infection rate decreased from July 2000 on, with environmental pathogens (*Streptococcus uberis* and coagulase-negative *Staphylococci*) being the main causative agents. Surprisingly *Staphylococcus aureus* had minimum occurrence and could not be isolated at the end of the observation period.

Table 2 Share of bacterial agents in mastitis infection rates on the dairy farm under observation

Month of examination	<i>Share of bacterial agents in mastitis infection rates</i>						total
	1	2	3	4	5	6	
March	31	71	3	16	1	1	123
April	7	5	1	5	2	3	23
May	7	5	1	7	3	3	26
June	7	5	1	5	1	2	21
July	8	14	1	6	1	2	32
August	5	27	0	14	5	8	59
September	5	27	1	39	8	8	88
October	8	40	3	26	2	4	83
November	6	65	0	5	1	1	78

1 - *Streptococcus agalactiae*; 2 – *Streptococcus uberis*; 3 – *Staphylococcus aureus*; 4 – Coagulase-negative *Staphylococci*; 5 – beta-haemolytical *Streptococci*; 6 – *Enterococcus* sp.

The success of the measures can be seen in the fact that the originally high numbers of somatic cells (780,000 BT SCC/1 ml) decreased below the required 400,000 BT SCC/1 ml. Production of highest quality milk is only possible with continuous control of mammary gland health in the herd by implementing effective programmes of mastitis prevention and control. This is especially true if environmental pathogens like *Streptococcus uberis* and coagulase-negative *Staphylococci* are involved.

USING OF THE BEEF GALLOWAY BREEDS IN THE FOOTHILLS

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Summary

Selected parameters of the efficiency in the Galloway breeds and herd of the Bohemian Spotted Cattle hybrids with Galloway bulls and variety changes of the grazing grass were observed in Bohemian Forest foothills conditions. Age of the 1st calving has been in the galloway's cows 937.2 days and meantime 371.3 days. Calves weights in 120 days of the age were in the group G 137.9 kg and in the C x G 190.7 kg and at weaning at 210 days of age 160.2 kg (230.7 kg). It was reached the species variety progress of the grazing grass in connection with the low grazing's selectivity in the Galloways and F1 Galloway hybrids.

Key words: cattle, beef cattle, growth, fertility, grazing ecosystem

Introduction

Breeding of the beef cattle in foothills is more and more enforced beside milk cows breeding in the Czech Republic. Landscaping function by feeding down of grazing grass is indispensable part of the breeding. These areas are possible to keep and better by farming correct forms. Farming systems which support resumption and maintenance of the marginal regions are generally fewer economical viable and being extensive and farming in these areas is less profitable. Breeding cattle is effective only in case of state subsidy, whose goal is to provide on the one hand able competitive agriculture on the other hand cultural landscape in mountain region (Kvapilík, 1995). The are the natural conditions lower advantageous the preferable are extensive cattle breeds with reference to low nutrition and breeding requirements (Teslík et al., 2000). Using of the beef cattle in marginal areas in relation to landscape ecological stability was observed within research projects on Agricultural faculty of University of South Bohemia.

Material and methods

In the Bohemian Forest foothills conditions (1000 m) were observed since 1995 in two breeds (Galloway cattle and hybrids Bohemian Spotted Cattle with Galloway) growth parameters in calves (average increase of weight, weight in the age 120 and 210 days), reproduction parameters (first calving age and meantime). The grazing influence on overgrowth structure of herbage was tested, too.

Results and discussion

Effectiveness beef cattle herds are influenced especially by reproduction results. Average age by first calving (table 1) was 937.2 days in cattle with the variability from 674 to 1092 days. It is coming with downgrading conditions attend to (regardless of breed) age prolongation by first calving (Frelích et al., 1997). Average length of meantime was 371.3 days. Cattle calving have not been during year even. Cattle were mostly calved in the months April – June. Dufka et al. (1996) recommends for the beef cattle breeding the most optimal time period for calving from January to March, because the grazing grass is better utilized, which positive influences milk – yield cattle and calves weight.

It was discovered higher increase of weight in the hybrids group against group G owing to higher milk yield of the cattle and by heterosis effect. Weight (table 2) in the age 120 days and 210 days was significant higher (60.2 kg let us say 230.7 kg) against the group G (137.9 let us say 190.7 kg). Average daily increases of weight were by both groups higher to 120 days of age. The expressive decrease of growth intensity from 120 to 210 days has been in the group calves G (- 37.9 %), which was influenced especially by later calving time period.

It is possible to document by the research results grazing cattle on the herbage structure the positive effect of the continual grazing. It was developed the species variety of the observed herbage by regular fertilizing and extensive grazing (table 3 and 4). Beside positive influence of the Galloway cattle grazing on the herbage species variety is very significant also melioration effect, which is possible to document by changes of structure ruderal grazing grass. Strong regression of the sorrel is related to low grazing selectivity, which is for the Galloway specific.

Discovered results verify Galloway using in foothill conditions in relation to modesty, excellent mother traits and out of production function by landscape maintenance.

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Table 1 Selected parameters of the fertility in Galloway cattle

Parameter	Galloway dams			
	count	average	min	max
1 st calving age (days)	19	937.2	674	1092
Meantime (days)	12	371.3	295	473

Table 2 Results calves growth of the Galloway and hybrids of F1 generation with Bohemian Spotted Cattle

Parameter		G	C x G	t-test
Live weight at 120 days of age (kg)	count	23	31	2.09++
	average	137.9	160.2	
	min	99	101	
	max	187	200	
Average daily gain from birth to 120 days of age (g)	count	23	31	2.07+
	average	982	1168	
	min	655	675	
	max	1391	1500	
Live weight at 210 days of age (kg)	count	23	31	3.06++
	average	190.7	230.7	
	min	128	183	
	max	278	286	
Average daily gain from 120 to 210 days of age (g)	count	23	31	20.3+
	average	609	784	
	min	220	456	
	max	1253	974	

Table 3 Development of the total species amount in grazing growth with different nutrient reserve by the absence of the fertilization and by continual grazing by Galloway

Station with base source of nutriment	The total number of species in grazing growth				
	n				
very strong	12	17	22	24	35
Strong	19	26	25	28	39
medium	22	28	31	29	37

Table 4 Development areas structure of the ruderal grazing growth during their continual grazing of Galloway without fertilization

Agrobotany group - species	Development of vegetation in grazing growth				
	% D				
Empty areas	2	1	+	.	.
Grass total	61	37	68	54	50
Trifolium total	4	3	5	20	33
Other plant total	33	29	27	26	17

%D = ability to cover of individual species, resp. of agrobotany groups (in %)

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THE EFFECT OF DIFFERENT EGG SET WEIGHT ON CHICKEN HATCHING

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Summary

The influence of varied egg set weight of the Hampshire breed and ROSS 208 hybrid on the chicken eggs of medium weight on hatching was examined in the work. The highest hatchability ($89,67 \pm 6,79$ % and $89,07 \pm 8,53$ %) was recorded for the ($60,0 \pm 0,5$ g and $58,0 \pm 0,5$ g respectively). The highest embryonic mortality was observed close to the end of incubation. The highest egg set weight losses during incubation were recorded for the Hampshire breed hatching eggs with weight $58,0 \pm 0,5$ g ($30,47 \pm 0,92$ %) and for the ROSS 208 hatching eggs with weight $60,0 \pm 0,5$ g ($29,27 \pm 0,81$ %). The highest weight of hatched chicks ($43,89 \pm 3,15$ g and $42,85 \pm 3,23$ g) was recorded for the highest weight egg set ($63,0 \pm 0,5$ g and $61,0 \pm 0,5$ g respectively). The weight of hatched chickens fell between 65 – 72 % of the egg set weight.

Keywords: weight; embryonic mortality ; egg weight losses ; hatchability

Introduction

The fowl egg is a large and at the same time very complicated cell serving the reproduction purposes. The egg weight is directly proportional to the hen body weights. According to Arafa et al. (1982), the egg reaches its typical weight 3 months after the laying. Asuwou and Okon (1993) observed that the egg set weight had an evident influence on the hatchability. The highest hatchability is achieved from the medium size eggs (Wilson 1991). The weight of the hatched chicken is primarily determined by the weight of the egg and regularly represents 62 – 70 % of the egg set weight. Secondary, it is determined by the egg weight losses occurring during hatching, the hatching time, the age of the layer as well as the chicken sex (Wilson and Harms, 1988). Končková and Baumgartner (1990) examined the relationship between the weight of embryos and the egg set weight. No dependence was observed between the weight of the monitored embryos on the 8th, 13th and 15th day of incubation and the egg set size. Shamawany (1984) proved that there was a positive relationship between the egg set weight of embryos from the 18th day of hatching on as well as the weight of the hatched chicks. The aim of our work was to determine the influence of the egg set weight of the Hampshire breed and ROSS 208 meat hybrid on the hatching of chicks.

Material and methods

The Hampshire breed egg set with weight $55,0 \pm 0,5$ g, $58,0 \pm 0,5$ g and $61,0 \pm 0,5$ g as well as the ROSS 208 hybrid egg set with weight $57,0 \pm 0,5$ g, $60,0 \pm 0,5$ g and $63,0 \pm 0,5$ g from parental brood aged 30 – 48 weeks were used in the experiment. The egg set were hatched in BIOS MIDI hatcheries at $37,5 - 38,2$ °C. Relative air humidity in the hatcheries was between 55 – 60 % (first 18 days of incubation) and 65 – 90 % (final 3 incubation days). Before the eggs were set to the hatcheries, they were stored at 8 – 10 °C temperature and 55 – 70 % relative air humidity for a week. The following indicator were observed during the hatching process: egg weight losses, embryonic mortality, hatchability from eggs placed to the hatcheries, and the weight of hatched chicks.

The results given in the tables were arrived at from our 4 successive repeating.

Results and discussion

In the experiment, the influence of the Hampshire breed and the ROSS 208 egg set weight on hatching was examined. The highest losses in weight were recorded for the Hampshire breed egg set with weight $58,0 \pm 0,5$ g. The losses reached $30,47 \pm 0,92$ %. High losses occurred also during the incubation of the $60,0 \pm 0,5$ g ROSS 208 hybrid egg set ($29,27 \pm 0,81$ %). On the contrary, the lowest egg set weight losses ($25,03 \pm 1,21$ %) for the Hampshire were recorded during the incubation of the $55,0 \pm 0,5$ g egg weight set. The lowest losses in weight for the ROSS 208 hybrid ($25,53 \pm 1,45$ %) were recorded during the incubation of the $57,0 \pm 0,5$ g weight set. During the incubation, the lowest losses were recorded in the period between the 7th and 14th incubation day. Our experiment showed higher than 20 % weight losses, which does not correspond with the findings of Bolla (1990). Higher weight losses are probably a result of a longer storage time (Noda et al. 1997) as well as a worse quality of the egg set (Whitehead et al. 1993). The weight of hatched chicks was directly proportional to the weight of egg set, which corresponds with the findings of Wilson and Harms (1988). The lower average chicken weight achieved from the $58,0 \pm 0,5$ g egg set, in the case of the Hampshire breed, and from the $60,0 \pm 0,5$ g egg set, in the case of the ROSS 208 can be seen as a result of the fact that in these groups there were more eggs from the 48th week of age of the layer, with an increased share of the white and shell (Burley and Vadehra 1989). In our experiment, the weight of hatched chicks reached 65 – 72 % of the egg set weight, which is also confirmed by (Wilson 1991). The lowest hatchability of the Hampshire

breed was recorded for the $61,0 \pm 0,5$ g egg set weight (the hatchability from the eggs placed to the hatchery reached $84,93 \pm 7,33$ %). In the case of the ROSS 208 hybrid the lowest hatchability ($86,48 \pm 5,68$ %) was recorded for the $63,0 \pm 0,5$ g weight egg set. On the contrary, the Hampshire breed reached the highest hatchability ($89,07 \pm 8,53$ %) from the $58,0 \pm 0,5$ g weight egg set, and the ROSS 208 reached its highest hatchability ($89,67 \pm 6,79$ %) from the $60,0 \pm 0,5$ g weight egg set. Our result correspond with the result of Polyanichkin and Vorokova (1992). Ausqou and Okon (1993) recorded their highest hatchability also from the medium size egg set. The highest embryonic mortality was observed during hatching ($9,28 \pm 3,81$ % for the Hampshire and $6,99 \pm 4,63$ % for the ROSS 208). This is confirmed also by the findings of Reddy et al. (1998). Our findings contradict the conclusion of Mindur (1985) who found out that almost 75 % embryonic mortality occurs during the final 3 hatching days. Our results do not correspond with the observations of Whitehead et al. (1988) either, since they claim that the highest embryonic mortality occurs during the first incubation week. The highest fertility of the Hampshire breed egg set ($93,14 \pm 3,28$ %) and the ROSS 208 hybrid egg set ($95,31 \pm 3,79$ %) was recorded for the $58,0 \pm 0,5$ g and $60,0 \pm 0,5$ g weight egg sets respectively. This does not correspond with the results arrived at by Appleby et al. (1998) either. According to Cunninghamman (1980), the utility of chickens is influenced more by the fact of belonging to specific breed or hybrid than by the weight of chickens hatched from the egg set with varied weight.

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NATURAL OCCURRENCE OF FUNGI IN FEEDING WHEAT IN THE AGRICULTURAL FARM FACILITIES

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Summary

During the whole period of storage, starting from harvest, quantity as well as taxonomic identification of isolated fungal genera (species) were determined in feeding wheat. Samples were collected from 7 farms. The objective of this experiment was to examine changes in isolated fungal populations during the wheat storage period. The highest fungal population densities were determined immediately after harvest (10^4 - 10^5 cfu.g⁻¹ wheat grain). In the following assessments, the highest fungal density reached $1.09 \cdot 10^4$ cfu.g⁻¹ at one samples sites. 24 fungal genera were isolated from the samples tested. The most dangerous fungi be long to the genera *Aspergillus* and *Penicillium*, were determined in 67-100% and 50-88% of the samples tested, respectively. The above mentioned genera can strongly damage stored cereals by their capability of grain moulding as well producing mycotoxins and alergens. Species determined as *Aspergillus fumigatus*, *Aspergillus flavus* etc. can contaminate wheat used for feeding purposes.

Key words: microscopic fungi, wheat, storage.

Introduction

The colonisation of aerial plant parts by micro-organisms starts almost as soon as leaves of inflo-rescences are exposed to the air. Bacteria usually colonise first but they are soon followed by yeast and then by pathogenic and saprophytic filamentous fungi. Filamentous fungi continue to develop throughout the plant's growth but especially as the plant senescences and seed ripens. Harvest profoundly disturbs the ecosystem and marks the transition from the extremes of the field environment to the relatively stable conditions of storage (LACEY, 1989).

Many species of fungi mainly *Fusarium*, *Aspergillus* and *Penicillium* are not only recognised plant pathogens but are also sources of the important mycotoxins of concern in animal and human health (ABRAMSON, 1997; PLACINTA et al., 1999).

Material and methods

The experiment was carried out in seven agricultural farms. Five of them were located in the south-west part (A, B, C, F and G) and two ones (D and E) in the middle of Slovakia. All farms had not special storage buildings. The first samples of stored feeding wheat were collected immediately after harvest (end of July to beginning of August) from the storage facilities of the mentioned farms. The others samples of wheat were collected during storage (four to ten months) monthly. Malt agar and Czapek-Dox agar were used to isolate and identify individual genera and species. Incubation was carried out at 25 °C for 5-10 days. Taxonomic identification of all colonies considere different was achieved through macroscopic and microscopic studies.

Results and discussion

Fungi are the most important spoilage organisms in cereal grains. Mould growth leads to reduced nutritional and technical quality of cereals grains (SCHNÜRER & JONSSON, 1992, HASAN, 1999). Cereal grain and cereal meal inevitably lead to the contamination of the final mixed feed with moulds (CHELKOWSKI, 1991).

The highest mycological contamination of wheat was found out in the first samples after harvest, with high reduction already during followed month of storage. During next months of storage the mycological contamination was stabile and very low ranged from 10^2 to 10^3 cfu.g⁻¹. The moisture of stored wheat in all agricultural farms ranged from 8,8% to 12,8% dry matter. Under such low moisture conditions the moulds are not able to growth (WILLIAMS, 1991).

The mycological contamination after harvest in our five agricultural farms was similar as documented by SEILER (1986). The mycological contamination of wheat can be considered as a good when moulds cfu is in range from 10^3 to 10^5 per gram (SCHNÜRER & JONSSON, 1992).

In two farms the mycological contamination after harvest reached 10^6 cfu per gram. The high cfu of moulds (10^7) is observed under the poor harvest years (SEILER, 1986).

24 fungal genera were isolated from the samples tested . Their presence was not influenced by the time of storage except *Cladosporium* after harvest . The most frequently isolated genera were *Aspergillus*, *Acremonium*, *Alternaria*, *Aureobasidium*, *Cladosporium*, *Penicillium*, *Rhizopus* and *Ulocladium*. It is necessary to point out that the isolated genera *Aspergillus*,

Penicillium. Claviceps and Fusarium are considered as the most important producers of mycotoxins (DIEKMAN & GREEN, 1992).

We have found a high frequency of field fungi especially Alternaria. The frequency of Alternaria occurrence in the wheat samples of all farms was not influenced by time of storage. Though there is evidence in literature that with a time of storage the number of Alternaria in the wheat reduced even to a zero values after 14 weeks (ABRAMSON et al., 1980, cit. JESENSKÁ, 1987). At harvest there is a high occurrence of Alternaria in wheat what can persist during the whole storage if the grain moisture is lower. However when the grain moisture is higher the typical storage fungi (Aspergillus, Penicillium) start to grow up and consequently they have antagonistic effect on the vitality of Alternaria and this fungus soon dies (LACEY, 1989). Thus the Alternaria occurrence can serve as a indicator of recently harvested wheat or good storage conditions (CHRISTENSEN, 1987).

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EFFECT OF ENERGY INTAKE ON LIPID PROFILE IN PIGS

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Summary

The lipid profile in relation to the various levels of energy in feed ratio was studied in the pigs of the hybrid population Seghers slaughtered in the High-standard Testing Station of Fattening and Carcass Value (HTSFCV) in Nitra. The contents of total lipids, cholesterol and glucose in blood serum were non-significantly higher in the group of the pigs fed by the feed ratio containing 12,699 MJ/kg ME comparing to the group provided with the feed ratio containing 12,975 MJ/kg ME. At the same time, the concentration of triglycerides was significantly higher in the first group of the pigs.

Key words: pigs, blood serum, total lipids, triglycerides, cholesterol, glucose

Introduction

Pigs via their physiological attributes are predestined for economical and effective meat production. Therefore, careful attention must be given to the biological principles of pork production and the breeding objectives in the matter of meat quality.

Proteosynthesis volume is affected by optimal nitrogen intake as well as optimal and balanced intake of metabolizable energy (ME).

Interior status of organism is regulated by control mechanisms and, at the same time, many factors, from which nutrition cannot be excluded, are associated with its changes within the physiological range (Sommer, 1998; Kollárová, 1997).

Performance of pigs depends, beside other factors, on the intensity of nutrient metabolism. The earlier studies have confirmed that the animals with more intensive metabolism performed higher meat production, whereas the animals with lower intensity of metabolism showed tendency to fat production (Vrzgula et al., 1982; Schenk and Kolb, 1991).

The objective of this study was to evaluate relationship between ME intake in feed and content of selected lipid parameters in blood serum of pigs.

Materials and methods

The pigs of the hybrid population Seghers were submitted to the experiment in the HTSFCV equipped by a phase system of feeding mixture preparation controlled by computer. The 1st group of pigs was fed by 12,699 MJ/kg LBW (live body weight) of ME; 9,515 g/kg LBW of lysin and 29,796 g/kg LBW of fibre from 76 to 100 kg of live body weight. The 2nd group received feed with higher level of nutrition composed of 12,975 MJ/kg LBW of ME; 10,482 g/kg LBW of lysin and 28,095 g/kg LBW of fibre. Mean weight gain in the 1st group was 898,33 g/day and in the 2nd group 829,0 g/day. Backfat thickness in the 1st group was 1,87 cm and in the 2nd group 1,75 cm. The pigs were slaughtered when they reached 100 kg LBW, and the blood samples were collected in order to measure the levels of total lipids (TL), triglycerides (TG), cholesterol (CHOL), glucose (GL), cortisol (COR) and thyroxin (THYR).

Results and discussion

In the both groups the levels of all the measured parameters did not exceed the physiological limits (SOVA, 1981). All the parameters reached higher rates in the 1st group. The serum content of total lipids was 3,03 g/l whereas total lipids in the 2nd group were non-significantly lower. Significantly higher amount of triglycerides was found in the group of pigs fed by lower level of energy. The average rate in this group reached 1,05 mmol/l and in the 2nd group it was 0,08 mmol/l lower. Serum of the pigs in the 1st group contained also higher amount of cholesterol (2,73 mmol/l) although the difference between the groups was not significant. Glucose level was rather similar in the both groups.

Intensity of metabolism depends on hormonal regulation therefore the amounts of cortisol and thyroxin in blood serum of the pigs were evaluated by RIA method.

The levels of cortisol and thyroxin were lower in the pigs of the 1st group that refers to metabolism with tendency to lipogenesis. This theory was confirmed by higher backfat thickness in this group. On the other hand, the higher daily weight gain of these pigs can be attributed to more efficient feed conversion. However, lower intensity of metabolism caused that especially adipose tissue benefited from this effect as it has been described by Schenk and Kolb (1991).

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Table 1 Statistical values of lipids and hormones in blood serum of pigs

Parameter	n	x	s	v	T
Total lipids [g/l]	26	3,03	0,55	18,16	-
	31	2,94	0,44	14,93	
Triglycerides [mmol/l]	26	1,05	0,20	18,60	+
	31	0,97	0,12	12,76	
Cholesterol [mmol/l]	26	2,73	0,40	14,64	-
	31	2,61	0,41	15,85	
Glucose [mmol/l]	26	4,36	0,35	7,96	-
	31	4,33	0,34	7,86	
Cortisol [$\mu\text{g} \cdot 10^2/\text{l}$]	26	1,68	0,76	45,17	
	31	1,81	0,82	45,70	
Thyroxin [$\mu\text{g} \cdot 10^2/\text{l}$]	26	1,14	0,63	55,77	
	31	1,29	0,11	8,86	

GEESE GENOFOND RESCUE IN SLOVAKIA

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Summary

After the only geese breeding pen in Slovakia had extinguished, problem with biological material for multiplication farms occurred. Agriculture enterprise Tešedíkovo had been requested to elaborate project of geese genofond rescue. First stage of this project was aimed to create conditions for stepping over multiplication to breeding farm status, as well as the new geese type creation based on Tešedíkovo geese genofond (lvagees 003 mated inter se) and genofond from imported geese, eligible for large - scale conditions. Revitalization project starts in 1996, when geese selection based on health status, constitution and body conformation was realized within breeding pen. In 1997 were imported ganders of 2891 type from Czech republic, appointed to cross with Tešedíkovo geese with concern to increase growing and slaughtering characteristic of the progeny. Arisen crosses of F1 generation (2891 ganders x Tešedíkovo geese) and original Tešedíkovo goslings were both tested for fattening characteristic and results mutually compared. In 1998 were imported ganders of Babati type from Hungary to improve further growing and slaughtering quality of Tešedíkovo geese. In 1999 30 geese groups were composed (10 groups TxBa, 10 TčxTč, 10 TčxBa). In breeding pen individual control of reproductive parameters and its progeny were tested in growing tests. Obtained results were analyzed and evaluated. Based on these results heritability value of each parents combination within breeding pen were stated. In the year 2000 after fulfilling every criteria has been this farm acknowledged as on breeding. We suppose, that in 2004 cultivation of this commercial type will be brought to an end and admitted as an official geese type.

Keywords: Geese, cultivating, reproductive, fattening and growing parameters

Introduction

Goose, formerly wide - spread and popular sort of poultry, has lost its position during last years. Geese number declined rapidly and today presented 0,68 % of total poultry amount kept in Slovakia. Comparing with pre - war period, when 1 856 471 geese were kept in Slovakia, arounded 15 % of total population of poultry (Staško, 1976), is this state alarming.

After transition to large - scale production geese number declined. Goose, herbivorous and pasturing animal requiring water basins, has less effective utilisation of grain fodders and up to now is kept mainly by semi - intensive methods. Serious shortcoming comparing with other poultry species are also inferior reproductive parameters.

Despite of these facts, geese breeding and cultivation in 70' s and 80' s in Slovakia has attracted attention. Besides several specialised farms, also Station for geese breeding and cultivation in Hroboňovo (nowadays Dolný Štál) arisen.

Transformation process to the market - oriented economy had negative influence on geese breeding in Slovakia. Cultivating breeding farm in Dolný Štál has privatised and new management was unable to conserve previous breeding status as an cultivating breeding farm.

After years 1993 - 1995, after abolishment of cultivation farm in Dolný Štál, goslings in Slovakia were produced by agri - coop Tešedíkovo, which ask for a business plan.

Based on this fact, revitalisation programme of geese genofond saving was proposed. Aim of the first stage was to create condition for achieving level of cultivation farm, as well as to create geese type suitable for large - scale condition based on Tešedíkovo (lvagees 003 inter se crossed, named as Tešedíkovo geese) and foreign geese genofond.

Material and methods

Geese breeding revitalisation in Tešedíkovo begun in 1996. Geese flock presented in Tešedíkovo (originated from breeding farm Hroboňovo) was strictly selected based on health status, constitution, body conformation and body weight.

Geese were separated into breeding groups according to age and reproductive parameters were monitored.

In 1997 were imported ganders of the 2891 type from Czech republic with purpose to increase growing and fattening ability and body conformation improving. After its rigid selection (based on health status, copulation organs development, weight an whole body creation) were in 1998 introduced to breed, were breeding pen consisted from Tešedíkovo geese (T) and 2891 ganders been created. Its progeny (F1 cross - Tč) were tested in fattening test along with goslings of T geese up to 16 weeks of age. After fattening test ends, slaughtering analyse of selected average samples were executed. In 1998 the Babati (Ba) ganders from Hungary were imported and introduced to cultivation process in 1999 breeding season.

In this year 30 geese tribes were composed (10 tribes of following combinations: Tx Ba, TčxBa, TčxTč). Within tribes egg laying parameters, fecundity and hatchability were monitored. Growing test of goslings of breeding pen parents was executed (within 3 following sets up to 10 weeks of age), aimed at growing intensity and its weight. Goslings were tested in the same conditions. Following obtained results we were able to evaluate heredity abilities of parents from breeding pen. This method was held also in the year 2000. Naturally, during the years 1996 - 2000 also reproductive parameters of geese in breed by groups were evaluated as well. Following set method cultivation work will end in 2004, when after fulfil all criteria will be this commercial geese type acknowledged.

Results and discussion

Level of reproductive parameters is crucial for geese breeding rentability. Its improving in geese keeping is complicated by lower heritability coefficient and frequently are in antagonistic relation.

On Tešedíkovo farm was egg production owing to selection increased as follows: in 1996 was 24,38 per goose, in 1997 within first two groups of 3 year geese - 31,67 and 36,74 per goose, 4 years goose - 49,46 and 43,12 eggs per goose, in 1998 and 1999 was similar as the year 1997.

Toth (1990) evaluated reproductive parameters of Hungarian and Landaus geese for last 20 years and has stated, that egg production increased for Hungarian geese up to 50 %, for Landaus geese to 10 %. Similar results gained also Shaleva et al. (1991) by analysing geese 8 years selected on high laying production. Regressed genetical profit yearly was 2,7 eggs. Eggs fecundity belongs to characteristics influenced mainly by proper zooveterinary measurings in breeds.

On the Tešedíkovo farm egg fecundity faltered around 75 % in 1997, in 1998 declined and 1999 repeatedly increased up to 83,38 %.

It seems, that egg fecundity depends mostly on outer climatic factors, because is unsteady between years and decline is visible mainly in years with extreme temperature swings. For this conclusion testify also decline of ganders ejaculate production if daily temperature overstep 20 °C (Zeman et al., 1984).

Important reproductive parameter is also hatchability, also strongly influenced by technological level in breeds.

On the Tešedíkovo farm eggs hatchability in 1996 faltered around 67,14 %, in following years declined. Main problems on this farm are hatching eggs storing and obsolete hatching machines. Švec and Okal' (1982) summarised causes of low

hatchability as follows: high or low temperature and humidity in eggs storing place, long-termed storing, wrong hatching technique, wrong nourishment, shaking during manipulation with eggs.

On the Tešedíkovo farm were weight differences between Tešedíkovo geese and Tč crosses up to 28 days of age significant in favour of Tešedíkovo geese, between 56 and 84 days of age significant in favour of Tč crosses. There were no significant differences between named typed in older age.

Kočí and Kočíová (1993) found out, that growing is determined firstly by its origin followed by nourishment factors.

Following slaughtering analyse of goslings we ascertained, that butcher yield of T geese was 72,23 %, T ganders 70,08 %, cross geese Tč 76,61 % and Tč ganders 75,35 %.

Hudský et al. (1974) has stated yield of Rhyne geese within span 69,5 - 70,4 %.

Dissected trunk weight in Tešedíkovo of T geese was 2460 g, Tč geese 2602 g, T ganders 2700 g and Tč ganders 2774 g.

This corresponding with results Hudský et al. (1974), has stated, that dissected trunk weight of Rhyne geese was 2320 - 3017 g.

In the growing test we has tested crossbreeds of following combinations: TxBa, Tčx Tč, TčxBa. After analyse its growing intensity we found out, that the best results were reached from combinations: TxBa, TčxBa and TčxTč, resp.

Average daily increasing expresses for all period of growing test reached within males values from 68 to 72 g, females 61 - 64 g. Ács et al. (1995) has state, that genotype of geese had significant influence on body weight. This confirmed Puchajda et al. (1997), when compared gained results of Italian and Bilgoraj geese.

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THE INBREEDING ANALYSE IN BREEDING SERVICE USED BULLS OF SLOVAK SPOTTED BREED OF CATTLE IN SLOVAKIA

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Summary

In the set of 82 sires of Slovak spotted breed of cattle and their crosses divided into four groups according to genotype and phylogenetic relationship we analysed relationship of sires. The coefficient of relationship R_{xy} varied 0,00 - 0,20. In the whole set of sires there was only 2,44 % inbreeding sires with $F_x = 3,13$ and 6,25. Dimension of values we found did not cause any negative impact coming out of inbreeding.

Key words: cattle, sire, genotype, coefficient of relationship and inbreeding.

Introduction

The inbreeding in the breeding of farm animals is an important factor of successfulness of the breeding work. Its evaluation and control of the level is permanently necessary and actual from the point of view of detailness description and estimation of breeding value and followed acceleration of genetic progress.

The breeding structure of the bulls used in breeding service in Slovak Republic is various and at once for present period is characteristics. The farmers chosen the breed and the sires according to the result of offspring test but mainly for breeding value in milk and meat preference.

Working out the effective breeding programmes with utilization of our and foreigner breeds with attention to inbreeding can safe systematic and dynamic changes in breeding structure of used sires. If there is sustainable great population of cattle there is not risk of nonplanned undesirable inbreeding. The inbreeding can occur in the populations which are regarding as a gene reserve or in small populations. Mainly in the last years when A. I. is used plenary, the new biotechnical methods are used, by which the number of sires in breeding services are decreased but there is increasing of genetic gain on one side and at once it can cause increasing relationship and level of inbreeding on the other side.

The aim of this article is to analyse the relationship and breeding structure of sires used in breeding services in some regions of Slovakia.

The present, very often called classical breeding programmes in the cattle breeding comes from the works of RENDEL and ROBERTSON (1950), SKJERVOLD (1974). They supposed to reach in the population optimal genetic gain by means of A. I. of sires positively proved. According to of these authors, creation of breeding programmes is connected with estimation of genetic gain and to reach its optimum by model calculation, by analyses of conditions to reach suitable breeding structure of individuals in real population and economic effectiveness worked out breeding programmes.

Obtained genetic gain PŘIBYL and PŘIBYLOVÁ (1996) regarding as the most important factor successfulness of breeding work, because it determine tendency, way and aim of breeding work in future.

The breeding work is directing program which cover system of necessary steps to improve productive abilities of farm animals which decide to fulfil the aims of breeding. The aim of each breeding program is to cover all steps of breeding work into one system to provide in real condition with adequate economical effect of breeding type and standart.

In the process of high productive stock creation are proved sires very important and they play decisive role in intensity of breeding work intention to breed and to productive orientation.

Breed of cattle are in preminent dynamic movement. Their evolution is influenced by requirements of market, economical and veterinary condition etc. The sires have to be selected in relation to growth, evolution, health, fertility, exterior, meat and dairy performance. The source of these informations are parents, sibs, own performance and performance of offspring. These condition were solved by HACKENBERGER and FEWSON (1998). They found the portion of total effect of breeding work in pied cattle is for dairy performance 26 %, meat 25 % and 49 % for other marks.

Material and methods

The material for solving the established aim was obtained from breeding evidence of Slovak biological services, breeding station of bulls Nitra - Luzianky. We used the pedigree with whole evidence up to third generation of ancestors. The sires used in breeding we divided into four groups according to genotypes:

1) S 100, 2) S x M < 50, 3) S 50 x M 50, 4) S x M > 50, where Slovak spotted cattle is marked as S and dairy breeds (lowland red and black holstein etc.) as M.

The intensity of inbreeding and relations among sires mentioned genotypes we evaluated by means of coefficient F_x and collateral coefficient of relationship R_{xy} according to the WRIGHT (1922). Calculated values were worked by various statistical formulas.

Results

Obtained results an relationship in analysed set of sires filled up according to genotypes are presented in table 1 and 2.

In the most numerous group of Slovak spotted sires (82) (table 1) we found coefficient of relationship relatives sires $R_{xy} = 0,16$ with relatively high coefficient of variability (57,5 %) even it was lower than was in the group from (S x M > 50 %) where 80,76 % and $R_{xy} = 0,20$. There we suppose that lower number of sires caused higher relationship and higher variability. In the group of sires S 50 x M 50 we did not find any relationship, because there were only two sires.

Relationship of individual sires expressed by coefficient R_{xy} varied in limit 0,01 to 0,50 what is reason for high variability of this evaluated marker. By means significance test of differentiation in coefficients of relationship in groups of tested sires we found low statistically nonsignificant ($P > 0,05$) differentiation of this marker (table 2).

In the evaluated set of sires we found value intensity of inbreeding 3,13 and 6,25 only at two sires (UT 003 and STN 032), which represent 2,44 % of total sires used in breeding.

Discussion

The process of cattle improvement is based on the principles of selection and optimal reproduction the most suitable individuals of the population. The new biotechnical procedure in fertilization of cows are able to limit a number of individuals participating on creation of new generation. Similarly either high intensity of sires selection can cause negative results in creating homozygosity which we can absorb not only in small but also in a larger populations as it was stated by WILKE (1991) and others, according to them it is necessary to look after inbreeding permanently. We agree with such opinion on the basis of our analysis and obtained results in relationship of sires.

Detected relationship which we evaluated by coefficient of relationship $R_{xy} = 0,00 - 0,20$ we hold as high mainly in comparison with results of BOLDUAN (1966) who calculated R_{xy} of the black and white sires in values of 1,28 ; 1,51 ; 1,64 % and also SCHWARK (1966) who found $R_{xy} = 2,64$ % in the set of 100 sires of that breed. Our results are partially similar to that which found REEB (1982) who calculated for set of sires $F_x = 0,39 - 12,5$. The intensity of inbreeding with value of 3,13 - 6,25 % we found in our set of sires. We agree with opinion of KRISTEK (1996) who stated that used inbreeding when intensity is up to 6,25 did not negatively influence the population.

According to obtained results we suppose that conception of used breeding plans at present cannot have negative influence in population because of inbreeding. Judging of relationship according to pedigrees up to third generation of ancestors is suitable, but in spite of this knowledge of real origin of sires should be altogether with breeding value the main results of breeding work.

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Table 1. Relationship of the sires according genotype

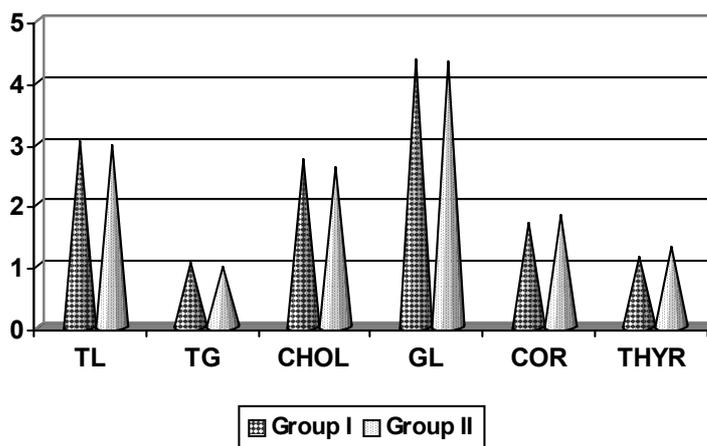
Genotype	R _{xy}			
	n	\bar{x}	s	v
S 100	82	0,16	0,09	57,51
S x M < 50	16	0,15	0,08	53,42
S 50 x M 50	2	0,00	0,00	0,00
S x M > 50	8	0,20	0,16	80,76

Table 2. Test of differentiation significance R_{xy} in breeding groups of sires

Genotype	S x M > 50	S 50 x M 50	S x M < 50
S 100	0,03-	0,00-	0,01-
S x M < 50	0,05-	0,00	
S 50 x M 50	0,00-		

- P > 0,05

Diagr. 1 Parameters of the interior status in pigs



SELECTION ON YOLK CHOLESTEROL CONCENTRATION IN EGG TYPE HENS

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Summary

The egg type hybrid Shaver Starcross 288 was used as parental generation for selection. The criterion for selection was cholesterol concentration (mg/100g yolk) and was based on both family and individual records. The concentration of yolk cholesterol in parental generation was 1876 mg/100 fresh yolk. After three generation of selection, the concentration was significantly lowered as in father as in mother lines. In father line was yolk cholesterol concentration lowered from 1876 mg/ 100 g yolk to 1574 mg/ 100 g yolk, i.e. lowering of 302 mg/ 100 g yolk (16.10 %). In mother line was yolk cholesterol concentration lowered from 1876 mg/ 100 g yolk to 1521 mg/ 100 g yolk, i.e. lowering of 355 mg/ 100 g yolk (18.92 %).

Introduction

There has been a steady decline of egg consumption over the last two decades in highly developed countries. Hall and McKay (1992) reported that in Great Britain dropped the annual *per capita* consumption in Britain from a peak of 275 eggs in 1970, to 225 in 1986. A similar trend has also been reported in the United States where adverse publicity over the amount of cholesterol in eggs has been implicated as a cause for the decline (Reesman and Thorton, 1988). In spite of contradictory role of cholesterol in human nutrition is evident that the higher consumption of cholesterol in human diet has various negative influence on human health (Šobra 1996, Daniška 1998, Beňo 1999, Pospisilova 2000). Therefore the lowering of cholesterol in human diet is usefully. In our report we presented the first results of selection for lowering the cholesterol content in egg of egg-type hens.

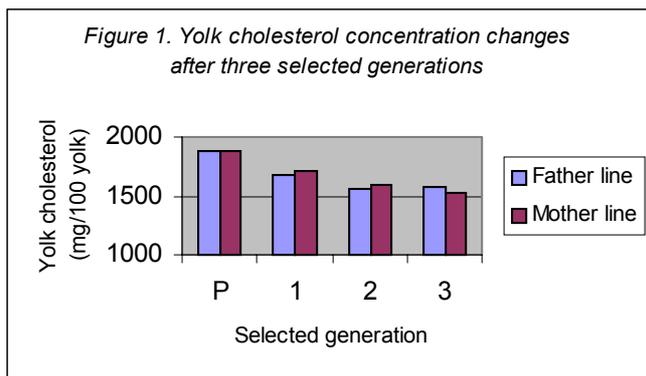
Materials and methods

The egg type hybrid Shaver Starcross 288 was used as parental generation for selection. The criterion for selections was cholesterol concentration (mg/100g yolk) and was based on both family and individual records. The cholesterol values were obtained 2 times from three consecutively laid eggs when the birds were about 30 and 36-40 weeks old. After measuring of egg weight and size and yolk weight a standard homogeneous sample of egg yolk was used from each quail layer for the chemical analysis. The yolk cholesterol concentration was estimated after enzymatic hydrolysis and oxidation (Cholesterol liquicolor test of Human Gesellschaft für Biochemica und Diagnostica mbH, Germany). The birds in rearing period 0 - 9 weeks received a grower ration for chickens HYD 04, in period 9 - 18 weeks HYD 05. After 18th week of age the hens were given diet containing 16 mg protein (NL) /kg. The metabolic energy (ME) in diet for adult hens was 11.0 MJ/ kg of diet.

Results

The influence of selection on egg yolk cholesterol concentration of hens after first three generation of selection is presented in Figure 1. The concentration of yolk cholesterol in parental generation was 1876 mg/100 fresh yolk. After three generation of selection, the concentration was significant lowered as in father as in mother lines. In father line was yolk cholesterol concentration lowered from 1876 mg/ 100 g yolk to 1574 mg/ 100 g yolk, i.e. lowering of 302 mg/ 100 g yolk (16.10 %). In mother line was yolk cholesterol concentration lowered from 1876 mg/ 100 g yolk to 1521 mg/ 100 g yolk, i.e. lowering of 355 mg/ 100 g yolk (18.92 %).

Our results confirm our selection findings in Japanese quail (Baumgartner et al. 1999, 2001), that the selection directed for lowering yolk cholesterol content may be successful both in hens as in quails.



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REPRODUCTION ABILITY OF GEESE TESTIFIED IN MTD ÚSTRAŠICE

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Summary

Geese of TčBa, selected in Agro-Váh, s.r.o. Tešedíkovo, were in years 1999 - 2000 testified in international parents test of geese of International random sample test station Ústrašice, Czech Republic. The reproduction ability -fertility, hatchability, egg production, egg weight as number of goslings hatched of TčBa combination of Tešedíkovo were comparable with the testified sample of Lipic geese from Germany. The livability of ganders and geese of TčBa was evidently better than of Lipic birds. The livability of ganders and geese of TčBa were 94.1 and 95.5 % but of Lipic birds only 90.6 and 93.5.

Introduction

The first-rate of the Plan of agriculture and the country-side of the Slovak Republic for 2000 - 2006 year period is the improvement of rural inhabitants quality and security of employment and appropriate income also for agriculture unprofitable regions at keeping of ecological accesses and permanent bearable development of rural regions. The other important priority is the establishment of concurrency able and efficient agriculture and greengrocery sector, able for full- valuable joining and working in countries of European Union, keeping the ecological and social justify proportion of agricultural utilization of productive factors at contemporary support alternative economical activities necessary for keeping of rural employment. The waterfowl, especially the geese are slipping away not only from the breeders but also from the life environment. Although the contemporary yield of waterfowl on the poultry meat consumption is in the Slovak Republic only 0.5 % (4 % in the world's measure) it is not only the important enrichment of poultry products assortment, but also the geese breeding build the labor occasions in middle and north regions of Slovak Republic, because they are rich for meadows and pastures.

Materials and methods

Geese of TčBa, selected in Agro-Váh, s.r.o. Tešedíkovo, were in years 1999 - 2000 testified in international parents test of geese of International random sample test station Ústrašice, Czech Republic. The number of tested female - geese were 155 and ganders 85. The sexes were separately housed in the departments up to the 56-day of age. In 56-day of age the birds were weighed and transposed to the pasture. In age 210 days were geese and ganders individually weighed and for breeding 100 geese and 26 ganders were selected. The selected birds were divided into 2 groups. One group was housed in the hall with the light regime (10 hours light) and the second group was in the hall with natural light regime. The birds in the rearing period and also adult birds were feed by industrial feeding mixtures VH 1 (ME_n 12.2 MJ. kg⁻¹, NL 19.5%), VH 2 (ME_n 12.4 MJ. kg⁻¹, NL 17.5%), KCH 1 (ME_n 11.2 MJ. kg⁻¹, NL 11.6%) a HU (ME_n 10.9 MJ. kg⁻¹, NL 17.4 %). The housing density was 2 birds.m⁻².

Results

The results are shown in Table 1 and 2. The reproduction ability -fertility, hatchability, egg production, egg weight as number of goslings hatched of TčBa combination of Tešedíkovo were comparable with the testified sample of Lipic geese from Germany. The egg production was higher in both groups artificial lighting, in Lipic geese were the difference 9.7 eggs and at TčBa geese was 5 eggs. Totally laid the Lipic geese 57.3 eggs and TčBa geese 54.8 eggs. The number of hatched goslings was 36.5 at Lipic geese and 35.0 at TčBa per 1 goose. The Lipic ganders were evidently heavies then TcBa ganders but at females were Lipic geese only at 218 - 313 g heavier.

The livability of ganders and geese of TčBa was evidently better than of Lipic birds. The livability of ganders and geese of TcBa were 94.1 and 95.5 % but of Lipic birds only 90.6 and 93.5.

Tabuľky - Benková

THE EFFECT OF AN MAGNETIC FIELD ON THE CHICKEN HATCHING

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Summary

In the work the influence of magnetic field with the intensity 0,04 T on hatching of ROSS 208 chicken was observed. In the eggs were influenced by magnetic field during their incubation. The hatchability in experimental groups decreased to $78,34 \pm 1,88$ % and $81,82 \pm 2,06$ %. The difference was relevant ($P < 0,01$). The negative influence of magnetic field was manifested by lower weight of the hatched eggs in experimental groups ($36,67 \pm 0,91$ g and $38,89 \pm 1,51$ g).

Keywords: chickens, hatching, magnetic field

Introduction

Magnetic field is a permanent component of the living environment of animals. It can be divided into a permanent magnetic field and a temporary one (Bearly, 1992). Every animal cell consist of molecules. When a cell is placed into a magnetic field, all molecules get magnetised (Tanokura and Suzuki, 1999). According to some sources, live organisms respond to a magnetic field because they contain the magnesite as a specific form of the iron (Mack et al., 2000). Stocker and van Gunsteren (2000) claim that animal cells create changing electric fields as part of their living processes, which then influence the creation of a temporary magnetic field of the cells. Neher (1982) proved that the application of a magnetic field to the animal cells results in the changes of permeability of cell membranes, the increase of thrombotisation and to on. The aim of our work is to determine the influence of a temporary magnetic field on the chicken hatching of hybrid ROSS 208.

Material and methods

In the experiment, the egg set of 480 eggs of the ROSS 208 meat hybrid aged 45 – 60 weeks was used. The eggs were divided according to their weight into two groups. In the first control and experimental groups the eggs weighing 56 – 60 g were included, while in the second control and experimental groups, the eggs weighing 61 – 65 g. The eggs included into control groups were not exposed to any magnetic field with the induction of 0,04 T during incubation.

In the work we were trying to determine the influence of a magnetic field on the chicken hatching during incubation. The eggs were hatched in the BIOS MONO 06 hatcheries. The magnetic field was applied to the chicken embryos 10 minutes daily during their whole incubation time. The following indicators were monitored during the incubation: the beginning of beakclapping, the beakclapping time, the hatching time, hatchability and the weight of the hatched chickens.

The results are based on the four consecutive experiments. They served as a basis for the calculation of the basic variance statistical indicators. The arrived at differences were tested by the Student T-test.

Results and discussion

The evaluation of the monitored indicators (beginning of beakclapping, beakclapping time and hatching time) showing the influence of a temporary magnetic field applied to the eggs during their incubation did not reveal any greater differences between control and experimental groups. These results do not correspond with the findings of Veterány et al. (1998). In the experimental groups which chicken embryos exposed to a temporary magnetic field, a higher embryonic mortality was recorded and, as a consequence of this also a decrease in hatchability ($78,34 \pm 1,88$ % or $81,82 \pm 2,06$ %). In comparison with the hatchability in control groups ($89,83 \pm 2,03$ % and $92,18 \pm 3,61$ % respectively), the differences can be evaluated as evident ($P < 0,01$). Pan (1996) achieved similar results also. The application of an ultrasound during the incubation of chicken embryos also significantly decreased their hatchability (Veterány et al., 2000). More over, we think that the magnetic field slows down, among other things, the blood flow. This was also confirmed by Holan et al. (1982). The slowing down of blood flow belongs to the rheological factors causing the origin of the thrombosis (Vašků et al. 1984). According to Ganong (1993) the slowing down of the blood flow in the veins can cause the concentration of blood clots, which are not washed off fast enough and consequently, may result in the formation of the thrombosis. In our experiment we recorded an increase in the occurrence of thromboses in the heart of almost all fallen chickens. This could be related with the embolism of a great blood circulation (Boda, Surynek et al., 1990). Neher (1982) arrived at similar conclusions. The chickens hatched in the experimental groups had lower weight ($36,67 \pm 0,91$ g and $38,89 \pm 1,51$ g respectively), the chickens hatched in the control groups had higher weight ($41,31 \pm 1,03$ g and $43,14 \pm 1,97$ g respectively). Garcia Perez et al. (1999) claim that magnetic field makes possible the transfer of the electric charge in the organism and thus influence the metabolism. Our conclusions correspond with the conclusions of Varga and Oblyvač (1979), who prove that the decrease in body weight is one of the effects on a live organism which have been thoroughly discussed.

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DETECTION OF ENTEROTOXIGENIC STAPHYLOCOCCUS AUREUS BY IMMUNOCHEMICAL METHODS AND BY THE POLYMERASE CHAIN REACTION

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Staphylococcus aureus, staphylococcal enterotoxin, immunoprecipitation, Western blot, RIA, PCR, *sea*, *seb*

Summary

Staphylococcus aureus has been one of the most important microorganisms responsible for food borne disease. Food-associated intoxications are commonly mediated by heat-stable staphylococcal enterotoxins (SEs). The production of staphylococcal enterotoxin A (SEA) and B (SEB) in reference strains of *S. aureus* and in 40 *S. aureus* isolates was examined by immunochemical methods such as Ouchterlony immunoprecipitation, Western blot and RIA method. The presence of *sea* and *seb* genes have been tested by polymerase chain reaction. Minimal detection limit was established as 50 pg/50 µl of reaction mixture to detect *sea* and *seb* genes by PCR. In reference *S. aureus* strains, PCR results were identical with SEs production. In *S. aureus* isolates, *sea* gene was detected in 8 (20%) out of 40 ones. In this 8 *S. aureus* isolates SEA production was proved either alone or with SEB. Gene *seb* was confirmed in 17 (42,5%) *S. aureus* isolates producing SEB or combination of SEB with SEA

Introduction

Staphylococcal enterotoxins (SEs) (MW 27 900-29 600) are exotoxins of *Staphylococcus aureus* and of some other types of staphylococci. Along with toxic shock syndrome toxin (TSST-1), exfoliative toxins (ETs), hemolysins and other extracellular proteins, SEs contribute to pathogenicity and virulence of the above microorganisms. SEs cause foodborne diseases (food poisoning) - i.e. afebrile alimentary enterotoxicooses with short incubation time (2-6h) and concomitant symptoms which include nausea, emesis and diarrhoea. It has been proved that SEs may participate in the toxic shock syndrome (TSS) cases (Munson et al., 1998) and play an important role in the pathogenesis of a number of infectious, inflammatory and autoimmune diseases in humans (nonfoodborne diseases) and animals. In animals mastitis in cattle and sheep are of the great importance.

The aim of the present study was to examine the production of staphylococcal enterotoxin A and B in 40 *S. aureus* field isolates by three different immunochemical methods and to detect *sea* and *seb* genes by PCR.

Material and methods

The reference (control) strains used were *S. aureus* FRI 722 (Food Research Institute, Madison, University of Wisconsin, U.S.A.) and *S. aureus* CCM 5757 (Czechoslovak Collection of Microorganisms, Brno, Czech Republic), that produced SEA and SEB, respectively. As negative controls, non-enterotoxigenic strains of *S. aureus* CCM 2351 (α -hemolysin) and *S. aureus* CCM 6188 (β -hemolysin) were used (Czechoslovak Collection of Microorganisms, Brno, Czech Republic). *S. aureus* field isolates were obtained from smears of technological equipment from food industry, swabs of throat and respiratory passages of food handlers, samples of pasta and sheep cheese. Bacteriological examination of samples has been done according to standards STN ISO 6888 (1997). Bacterial strains were cultured in 5 ml of Brain heart infusion broth for 18-24 h at 37°C with shaking. Supernatants of culture media were examined for the presence of SEA and SEB by modification of Ouchterlony method (Fotta, 1997) and by radioimmunoassay (RIA) (Gondol et al., 1997). In reference strains the enterotoxigenicity was determined by Western blot method as well (Harlow et Lane, 1988). The presence of genes for staphylococcal enterotoxins in *S. aureus* strains has been tested by PCR technique. Genomic DNA was isolated by phenol-chloroform method according to Sambrook et al. (1986). DNA concentration was determined spectrophotometrically (Spectronic Genesys™ 5). Oligonucleotide primers (SEA1, SEA2-20-mer, SEB1, SEB-20-mer) were selected on the basis of the study of Johnson et al. (1991). The total volume of PCR reaction mixture was 50 μ l with 3,0 mM MgCl₂, 2,0U AmpliTaq polymerase (Perkin Elmer) and 0.3 μ M specific primers. PCR was performed in Genius thermocycler (Techne, U.S.A) and comprised of: 94°C for 2 min.; 35 cycles of 94°C for 1 min., 55°C for 30 sec., 72°C for 30 sec; followed by a final extension at 72°C for 2 min.30 sec. Minimal detection limit for *sea* and *seb* *S. aureus* genes was determined by ten-fold dilutions of DNA template with initial DNA concentration of 500 μ g/ml. PCR products were identified on 2 % agarose gel after staining with ethidium bromide (0.5 μ g/ml) and visualization by UV transilluminator.

Results

Immunoprecipitation, RIA, Western blot

The immunoprecipitation revealed the synthesis of relevant staphylococcal enterotoxins (SEA, SEB) in all enterotoxigenic reference strains. In reference strains synthesising α -hemolysin or β -hemolysin the production of SEs has not been proved. The production of SEA and SEB was retested in control *S. aureus* strains by RIA method. The presence of SEA in culture medium supernatant was proved in *S. aureus* strain FRI 722, that of SEB in *S. aureus* strain CCM 5757. In remaining reference strains, RIA results were negative. The bands obtained on nitrocellulose membrane by Western blot were at the same position as purified staphylococcal enterotoxins A and B (MW 27 800 and 28 336, respectively) on polyacrylamide gel. In 40 field isolates of *S. aureus* the presence of one of SEA or SEB enterotoxins or their combinations was indicated by immunoprecipitation and RIA in 20 (50%) samples. In case of 14 isolates from sheep cheese the production of SEB was the most often indicated (57% of isolates). One field isolate from smears from technological equipment produced SEB. Six isolates of *S. aureus* obtained from pasta produced SEA alone, SEB alone or SEA plus SEB. Production of these toxins in pasta was not confirmed in 12 isolates (67%).

Polymerase chain reaction (PCR)

By amplification of the target DNA sequence of reference *S. aureus* strain FRI 722 the 120 bp PCR product was obtained so the presence of *sea* gene in this strain was confirmed. In non-enterotoxigenic control *S. aureus* strains the result of amplification was negative. Using the reference strain *S. aureus* CCM 5757 the sequence with a length of 476 bp was determined by PCR. The lowest DNA dilution in which specific PCR products were still detected was 50 ng/ml. Based on this, minimal PCR detection limit was determined for 50 pg/50 μ l of reaction mixture to detect *sea* and *seb* genes. *sea* gene was detected by PCR in 8 (20%) *S. aureus* isolates in which the production of staphylococcal enterotoxin A was confirmed by immunoprecipitation and RIA. *seb* gene was detected in 17 (42,5%) out of total 40 examined DNA samples.

Discussion

Staphylococcal food poisoning (SFP) belongs to food borne diseases that are subjected to regular control in countries with developed food industries. SEA and SEB are the toxins most often detected in foods (Rasooly et Rasooly, 1998). SEA in particular causes staphylococcal food poisoning even at very low concentrations (0.6 ng/ml). McLauchlin (2000) reported that after 1990, the share of SEA in food borne disease was 23%. In comparison with this result 20% of our field isolates of *S. aureus* produced SEA and 42,5% produced SEB. Many methods have been developed for the detection of staphylococcal enterotoxins and enterotoxin-producing staphylococci. Three groups of detection methods are currently available, including biological assays, immunochemical assays and polymerase chain reaction-based assays (Su et Wong, 1997). In our work three immunochemical methods which differ by their detection limit (0,5-2,5 μ g/ml for immunoprecipitation, 2,5-25ng/ml for Western blot and 0,5-1ng/ml for RIA) were used for detection of SEA and SEB. Immunoprecipitation can detect only strains with relatively high production of SEs in contrast with RIA which can detect also low-producing strains. In our study it was found out that in one field isolate of *S. aureus* the production of SEB was indicated only by RIA but not by

immunoprecipitation. The presence of gene for expression of SEB was confirmed by PCR in this field isolate. The advantage of Western blot is detection of enterotoxins on the basis of their molecular weights. PCR offers the possibility of specific amplification of fragments of the genes responsible for enterotoxin production. It can also be used for the detection of staphylococcal enterotoxin genes the expression of which has not been proved for different reasons. The results of PCR obtained in our study were consistent with results of immunoprecipitation, Western blot and RIA in 97,5% of examined isolates of *S.aureus*.

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Fig.1.

Detection of staphylococcal enterotoxin A (SEA) and staphylococcal enterotoxin B (SEB) in culture supernatant fluids of *S. aureus* FRI 722-SEA and *S. aureus* CCM 5757-SEB reference strains by means of SDS-polyacrylamide electrophoresis (SDS-PAGE) and Western blot. Monoclonal antibodies against SEA and against SEB were used as the first antibodies.

A. SDS-PAGE

1. molecular weight markers (14, 20, 30, 43, 67, 94 kDa)
2. purified antigen SEA
3. crude antigen SEA (culture supernatant fluid)
4. purified antigen SEB
5. crude antigen SEB

B. Western blot

6. purified SEA
7. crude SEA
8. purified SEB
9. crude SEB

Fig.2.

Detection of *sea* gene encoding staphylococcal enterotoxin A (SEA) of *S.aureus* by means of PCR on 2% agarose gel.

1. standard: λ DNA digested by EcoRI/HindIII
2. 120 bp product of amplification-DNA *S.aureus* FRI 722-SEA
3. 120 bp amplicon-*S.aureus* FRI 722-SEA
4. negative control-*S.aureus* CCM 5757-SEB
5. negative control -*S.aureus* FRI 361- SEC
6. negative control- *S.aureus* 1151m-SED
7. negative control-*E.coli* M1

Fig.3.

Detection of *seb* gene encoding staphylococcal enterotoxin B (SEB) of *S.aureus* by means of PCR on 2% agarose gel.

1. standard: λ DNA digested by EcoRI/HindIII
2. 478 bp product of amplification. 3,0 mM MgCl₂
3. 2,5 mM MgCl₂
4. 2,0 mM MgCl₂
5. 1,5 mM MgCl₂
6. 1,0 mM MgCl₂
7. 0,5 mM MgCl₂
8. standard: λ DNA digested by HindIII

NUTRITIONAL AND BIOLOGICAL VALUE OF SPELT WHEAT

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Abstract

The nutritional value of two varieties of spelt wheat (*Triticum spelta* L.) was compared with the conventional variety of winter wheat (*Triticum aestivum* L.) grown in Slovakia and Sweeden. The biochemical analysis shows that the spelt wheat grains have significantly ($P < 0.001$) higher content of nitrogen compounds, crude protein, proteins, essential amino acids, lysine, more nonessential amino acids, fat, ash and BPV than winter wheat.

It was not find any significant differences between the varieties on the basis of biological test of growth in rats.

Key words: spelt wheat, laboratory rat, digestibility of crude protein, BVP and PER, NPU

Introduction

Wheat is the principal source of energy, protein and dietary fiber for a major portion of the world's population (1,2,3,4). While most of the world wheat crop arises from production of common (*Triticum aestivum* L.) and durum (*Triticum durum* DESF.) cultivars, there is increasing interest in ancient wheat species, especially spelt (*Triticum spelta* L.).

The aim of this work was to compare the nutritional value of the grain of the spelt wheat varieties (*Triticum spelta* L.) with common winter wheat cultivar Samanta (*Triticum aestivum* L.) and to test it on the basis of biological test of growth in rats.

Material and methods

Two spelt samples (*Triticum spelta* L.) and one common winter wheat – Samanta (*Triticum aestivum* L.) ecologically grown in Slovakia and in Sweden were observed. In all varieties the content of nutrients, protein fractions and amino acids were determined. The digestibility of crude protein, the nitrogen balance, protein biological value (BPV), protein efficiency ratio (PER), net protein utilization (NPU) and feed consumption per 1 gram of wheat increase were tested in six repeated experiments with rats of the Wister strain from the SPF breeding (Velaz Praha, Czech Republic). The tested wheat varieties represented the only source of nitrogen in the experimental diets, and crude protein (Nx6.25) created 10% dry matter of feed ration. The PER value was determined during the period of 21 days (feeding experiment) and the BHB value during the period of 7 days (balance experiment).

Results and discussion

Chemical analysis have shown (Table1) that the spelt wheat grains have significantly ($P < 0.001$) higher content of nitrogen compounds, crude protein, essential amino acids, lysine, more nonessential amino acids, fat, ash and BPV than winter wheat.

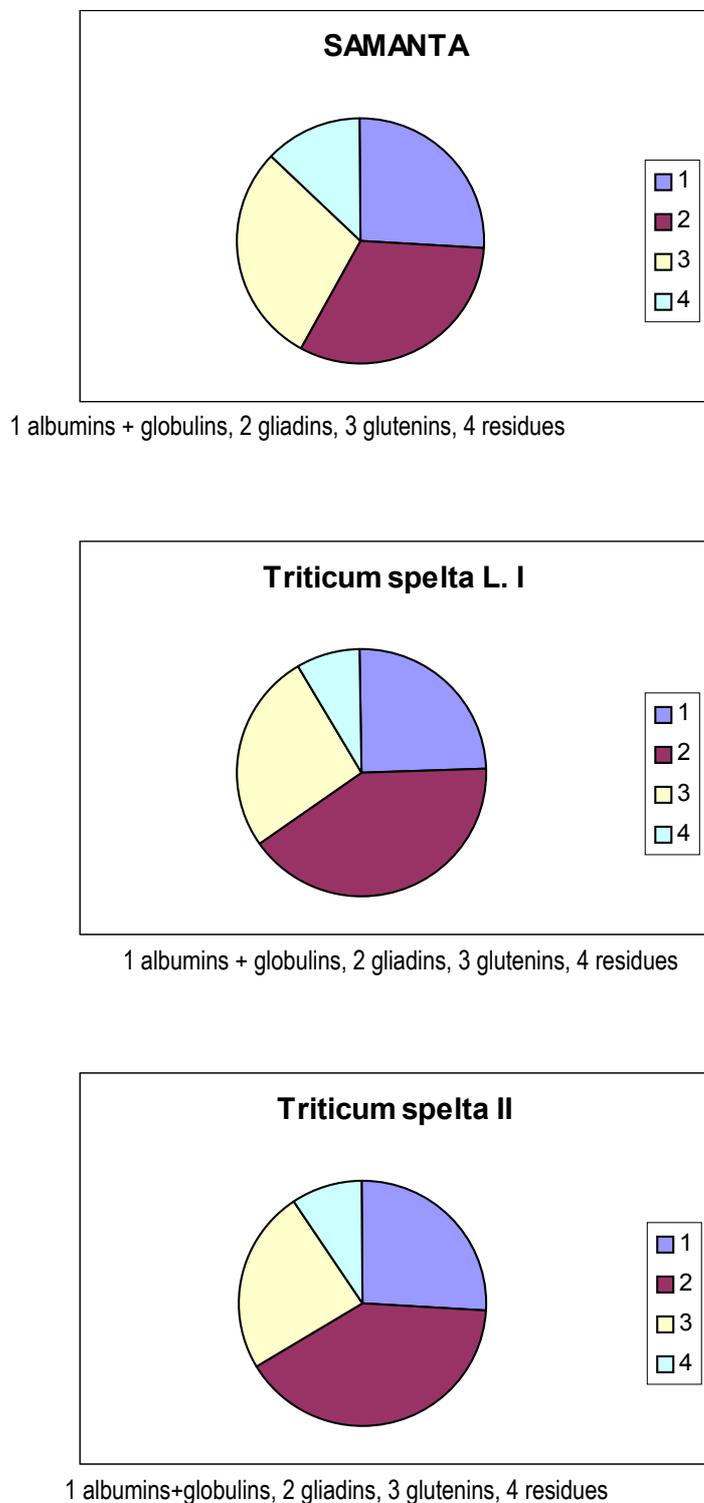
The crude protein digestibility and the nitrogen balance in experimental animals are very closed to protein quality. Low proportion of albumins and globulins (Fig.1) in spelt wheat conditions also the low concentration of lysine, threonine and arginine as well as high concentration of glutamic acid and proline which are the most frequent amino acid rasts in gliadin proteins.

Table 1 Content of crude protein, proteins and amino acids in tested varieties of wheat (g.10⁻² g dry matter)

Chemical compounds n = 4	Samanta		<i>Triticum spelta</i> L. I		<i>Triticum spelta</i> L. II		Significance of differences
	x	s	x	s	x	s	
Crude protein (N x 6,25)	9.99	0.38	16.36	0.37	12.71	0.33	1:2:3+++
Proteins	8.98	0.31	14.16	0.13	11.26	0.43	1:2:3+++
Total amino acids	8.74	0.40	14.84	0.73	11.30	0.43	1:2:3+++
Essential amino acids	3.40	0.19	5.46	0.20	4.12	0.28	1,3:2+++ 1:3++
Lysine	0.26	0.01	0.37	0.02	0.31	0.02	1,3:2+++ 1:3+
Threonine	0.28	0.01	0.45	0.02	0.35	0.03	1:2:3+++
Essential/nonessential AA	0.636		0.593		0.574		

Triticum spelta L I. – grown in Slovakia, *Triticum spelta* L. II. – grown in Sweden

Fig.1 Protein fractions of tested samples of wheat (% share in total N content)



The higher crude protein content and gliadin fraction in spelt wheat increased the proportion of proline to arginine and lysine compared with values in winter wheat. It decreased the total utilisation of proteins.

The highest biological protein value (BVP) was assessed for Slovak spelt variety of the tested wheats, however, the differences between the varieties were not significant. We found significant differences in faeces excreted N from intake N,

and it manifested itself in significant differences in crude protein digestibility which was higher in the samples of spelt wheat. The balance experiment has shown that the crude protein digestibility was in the case of the spelt wheat higher (85%) than in the Samanta cultivar (78%). It confirms positive relationship between the nitrogen content in wheat and his digestibility. Similarly, the proportion of retention nitrogen from the digested N in the spelt wheat was higher (51.5%) than in the Samanta variety (47.4%). The nondigestible part of the N-compounds from the feed diet was reflected in the nitrogen amount in excrement, which was considerably lower in the case of the spelt wheat. There were no significant differences in the amount of nitrogen excreted in urine among experimental groups.

Table 2 Results of testing the wheat varieties in metabolic trials on rats

Index	Samanta		<i>Triticum spelta</i> L I		<i>Triticum spelta</i> L II		Significance of differences
	x	s	x	s	x	s	
n = 6							
Crude protein digestibility %	78.12	2.56	85.08	1.59	80.47	0.65	1,3:2+++
Excrement N output from N uptake %	21.88	2.56	14.92	1.59	19.54	0.65	1:3+ 1,3:2+++
Urinary N output from N uptake %	41.12	5.40	41.20	5.56	41.71	2.99	NS
Protein biological value	73.37	6.88	75.63	5.53	72.13	2.57	NS
Net protein utilization	56.50	5.27	63.92	5.89	58.04	2.19	2:1,3+
Utilizable proteins %	5.64	0.53	10.46	0.96	7.38	0.28	2:1,3+++ 1:3+++

Triticum spelta L I. – grown in Slovakia, *Triticum spelta* L. II. – grown in Sweden

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EFFECTS OF THE COMMERCE SECTOR TRANSFORMATION ON THE NUTRIAS BREEDING STATUS IN THE SLOVAK REPUBLIC

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Summary

Transformation of the Slovak economy negatively influenced nutria's breeding status. Number of fair nutria's has declined from 18 000 animals in the year 1990 to 500 animals in the year 1995. Fur production declined from 80 000 to 3 500 pieces. After the common association of farmers, traders and furriers came into existence, number of animals and production in following years has softly increased. Main causes of farms breakdown were recession of Breeder's union activity, state grant-in-aid absence for breeders, decay of manufacturing capacities and price-cut of fur. Groundwork for further development of nutria's sector in Slovakia are high quality and production of fur, utilisation of cheap native feeds, breeding practise extension to new agoregions as a part of its economic prosperity.

Key words: economic transformation, nutria's breeding, fur production.

Introduction

Fur animal husbandry is an important part of the special animal production in Slovakia. The most important of its part under our condition is nutria's breeding, developed traditionally within small private breeds. Based on data from Kukla /1991/, yearly production of nutria's furs in former Czechoslovakia was 450 000 pieces. From that Slovakia itself produced around 80 - 100 000 furs /Točka, 1998/. Long-time cultivation work ensured high quality of furs produced /Suvegová-Mertin, 1996/. Transformation of the business sector in the 90's negatively influenced all sectors of agriculture. In our study we have zoomed our attention on evaluation of main factors partook in recession of the nutria's breeding as well on perspectives of its further development.

Materials and methods

Following data were analysed as a frame of monitored nutria's breeding subjects:

- history of nutria's number within the years 1990 - 2000;
- history of fur production within the years 1990 - 2000;
- main causes of nutria's production decline;
- possible perspectives for nutria's breeding advancement.

Results

History of the nutria's numbers and fur production within the years 1990 - 2000 are stated in Table 1 and Graph 1.

Following the data of basic flock number we can enunciate emphatic decline of the animals kept. The strongest tendency is displayed between the years 1991 - 1992, when depressed from original 18 000 to 4 700 animals, which represent 26,1%. During following years this negative trend continued up to year 1995, when number of animals reached limit of gene pool exposure. Establishment of The fur animals breeders association in the Slovak republic /at the Research Institute of Animal Production in Nitra/ was the reaction on this situation. Intra-associated were next to breeders also representatives of processing and commerce subjects and researchers. Results of such co-operation were manifested by sequential increase of nutria's number. This tendency was however still affected by negative economic situation.

Adverse balance in animal numbers went along with situation in fur production. Original production in the 1990 failed from 80 000 pieces to 3 500 in the 1995, which represent just 4,3 % from the original production. In the following period fur production softly increased.

Situation analyse shown as an main factors of the negative status in nutria's breeding and production following causes:

- unconcern of resort authorities to fur animal husbandry, in particular cancellation of the breeding service and utilitarian control;
- swoon of the Slovak Breeders Union activities;
- transformation and disintegration of monopolist enterprises on the field of fur purchase and processing;
- insufficient advancement and highness of sequential commerce sector on the field of nutria's fur processing;
- low fur prices.

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 TOČKA, I. : 1999. Chov nutrií na Slovensku. In : Slovenský chov, roč. 3, 1999, č. 10, s.19.

Table 1 Number of animals, sexual ratio and nutria's fur production in the Slovak republic within the years 1990 - 2000

Year	Number of animals				Furs produced	
	Females	Males	Total	%	Pieces	%
1990	15 000	3 000	18 000	100	80 000	100
1991	12 000	2 500	14 500	80,5	60 000	75
1992	4 000	700	4 700	26,1	25 000	31,2
1993	2 000	400	2 400	13,3	10 000	12,5
1994	1 500	300	1 800	10,0	8 000	10
1995	500	100	600	3,3	3 500	4,3
1996	800	150	950	5,2	5 500	6,8
1997	1 000	200	1 200	6,6	8 000	10
1998	1 200	250	1 450	8,0	9 000	11,2
1999	1 300	300	1 600	8,8	9 500	11,8
2000	1 500	300	1 800	10,0	9 800	12,2

INFLUENCE OF BIOLOGICAL ADDITIVES ON NUTRIENT CONTENT IN ALFALFA SILAGES

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Summary

In the experiments were verified the influence of biological additive application to nutrient content in alfalfa silages with different content of dry matter. In the experimental alfalfa silages with lower content of dry matter addition of lactic acid bacteria increased significantly the dry matter in comparison to nontreated silages. Application of biological additive significantly was increased content of crude protein in silages by 12,3 g. The silages with additional homofermentative lactic acid bacteria had significantly the lowest content of nitrogen free extract (NFE) and reduced sugars. In the experimental alfalfa silages with higher content of dry matter the addition of biological additive increased significantly content of dry matter by 7,7 g in comparison to control silages. As well as in the first series of experiments, in the silages with biological additive was the lowest content of NFE and significantly lowest content of reduced sugars. Experimental silages in both levels of dry matter had the lowest content of organic matter.

Key words: biological additive, alfalfa, silage, nutrient content

Introduction

Effectivity of cattle milk and meat production is significantly influenced by quality of fodders. Alfalfa belongs to the most important proteine fodders because of stabile and high dry matter production. In the balanced diets altogether with maize make alfalfa the main portion of fodder (Bíro, 2000). At present we are able to in Slovakia produced around 2 800 thousand tones of fodder dry matter and out of this there are 720 thousand tones dry matter from yearly fodders, 800 thousand tones dry matter from more years fodders and 1 270 thousand tones dry matter from permanent fodders (Sommer, 2000). Out of whole year needs of fodders are in our condition (60 – 70 %) conserved fodder and the rest 30 – 40 % is feeding fresh (Bíro, 1995). The composition of conserved fodders is cca 40 – 45 % silaged and 15 – 20 % is hay (Gallo, 1999 b). The decision problem in Slovakia is quality of sillages, while one of the factors which can improve the quality of silages is use of silages preparations. The suggestion of silages preparations either chemical or biological is small in comparison to other countries. At present there is in Slovakia allowed only 9 biological and 4 chemical preparations (Gallo, 1999 a).

Material and methods

In laboratory conditions was silaged alfalfa (*medicago sativa*) variety Palava from second harvest. In the variants $K_1 - P_1$ was silaged slightly fadded matter with content of dry matter 234 g.kg^{-1} and in the variants $K_2 - P_2$ was silaged fadded matter with dry matter content $288,4 \text{ g.kg}^{-1}$. The matter of alfalfa was cutted by stationar cutter to 15 mm lenght of chopped straw. In the control variants K_1 and K_2 was silaged nontreated matter of alfalfa. In the positive controls was alfalfa treated by concentrated formic acid (A_1 and A_2). In the experimental variants P_1 and P_2 was the matter treated by powder biological additive which was composed of *Lactobacillus rhamnosus* and *Enterococcus faecium*. The matter was by pneumatics press pressed in to silaged cylinders in the volume of 15 dm^3 , heaved by 10 kg weight and hermeticed. Each variant was silaged in 4 repeats. The fermentation process carried out at $20 - 25 \text{ }^\circ\text{C}$ and lasted 8 weeks. After the cylinders were open and samples were taken to establish content of nutrients according to STN 467092. The results of experiments were statistically worked out and tested by the methods of programme Statgraphics.

Results and discussion

Content of nutrients in fadded alfalfa, alfalfa silages with lower content of dry matter and significance of differencies in nutrient content are presented in table 1 and 2. The sillages treated by formic acid (A_1) contains significantly highest content of dry matter. The content of crude protein in the silages treated by biological additive (P_1) was significantly increased by 12,3 g in comparison to control silages K_1 . The lowest content of fibre was found in the silages treated by formic acid (A_1). Simmilary Jambor (1999) in the alfalfa silages with formic acid (dry matter content 22,4 %) observed lower content of dry matter in comparison to control variant K_1 . In opposite, the lowest content of nitrogen free extract (NFE) was found in the silages with addition of lactic acid bacteria (P_1). The content of reduced sugars was in the silages very variable, and vary from $5,7 \text{ g.kg}^{-1}$ dry matter (P_1) to $99,5 \text{ g.kg}^{-1}$ dry matter (A_1). Decreasing of organic matter content by 9,1 g in the silages of the variant P_1 was statistically significant in comparison to control silages of the variants K_1 . The nutrient content in the fadded alfalfa, in the alfalfa silages with higher content of dry matter and significe of differencies in nutrient content are presented in table 3 – 4. Addition of formic acid (A_2) significantly increased content of dry matter in comparison to control silages (K_2). Simmilary Jambor and Chromec (1997) found in alfalfa silages with formic acid significantly increasng of dry matter in comparison to nontreated silages. Either adding of lactic acid bacteria in the variant P_2 significantly increased content of dry matter in silages. The highest content of crude protein was found in the silages treated by formic acid (A_2). Increasing by 13,4 g was significant in comparison to control silages (K_2). Increasing of crude protein content in alfalfa silages with formic acid in comparison to nontreated silages observed Jambor (1999) either. In the silages treated by

Table 1 Nutrient content in the fadded alfalfa and in alfalfa silages with lower content of dry matter (in g.kg^{-1} dry matter)

		dry matter (1)	crude protein (2)	fat (3)	fiber (4)	ash (5)	NFE (6)	reduced sugars (7)	organic matter (8)
$L_1(9)$	\bar{x}	234	155,1	13	404,4	82,8	343,9	16,2	917,3
	s	10,2	4,5	0,4	20,5	3,6	16,4	4,2	3,6
	v	4,4	2,9	3,2	5,1	4,4	4,8	26,0	0,4
Variant(10)									
K_1	\bar{x}	232,7	157,2	23,3	396,5	85,5	337,6	11,1	914,6
	s	1,4	2,0	1,4	5,5	2,3	3,4	3,2	2,3
	v	0,6	1,2	6,2	1,4	2,7	1,0	28,4	0,3
A_1	\bar{x}	245,4	163,8	18,5	370,7	82,0	365,1	99,5	918,0
	s	4,7	5,5	1,9	10,0	1,5	10,0	49,7	1,5
	v	1,9	3,4	10,5	2,7	1,9	2,7	49,9	0,2
P_1	\bar{x}	238,2	169,5	26,7	377,0	94,5	332,3	5,7	905,5
	s	1,6	3,0	1,2	1,6	2,2	3,0	1,3	2,2
	v	0,7	1,8	4,5	0,4	2,4	0,9	22,8	0,3

6) NFE– nitrogen free extract, (9) wilted alfalfa, (10) lower content of DM – treatments: K_1 – control, A_1 – with formic acid, P_1 – with lactic acid bacteria

biological additive (P_2) was nonsignificantly higher content of crude protein than in control silages (K_2). The highest content of fibre ($350,2 \text{ g.kg}^{-1}$ of dry matter) was marked in the silages treated by biological additive (P_2). Svetlanská et al. (1999) present in the alfalfa silages, with dry matter content 25 – 30 %, the content of fibre vary from 273 g to 416 g.kg^{-1} dry matter with average content 351 g.kg^{-1} of dry matter. In the silages treated by formic acid (A_2) was significantly increased content

of nitrogen free extract (NFE) by 15,3 g in comparison to silages without treatment (K₂). The lowest content of NFE we found in the silages of experimental variant P₂. Similar tendency was found in the content of reduced sugars. The highest content of reduced sugars was in the silages with formic acid (A₂). The formic acid altogether with conserving effect contribute to storing of higher concentration of soluble saccharides (Škultéty et al. 1993). Significantly the lowest content of organic matter was found in the silages treated by biological additive (P₂).

Table 2 Significance of differences in nutrient content in alfalfa silages with lower content of dry matter

	K ₁ :A ₁	K ₁ :P ₁	A ₁ :P ₁
dry matter (1)	++	++	+
crude protein (2)	-	+++	-
fat (3)	++	+	+++
fiber (4)	++	+++	-
ash (5)	+	++	+++
NFE (6)	++	-	+++
reduced sugars (7)	+	-	+
organic matter (8)	+	++	+++

6) NFE – nitrogen free extract, - non-significant, + significant P < 0,05,
 ++ significant P < 0,01, +++ significant P < 0,001

Table 3 Nutrient content in fadded alfalfa and in alfalfa silages with higher content of dry matter (in g.kg⁻¹ dry matter)

		dry matter (1)	crude protein (2)	fat (3)	fiber (4)	ash (5)	NFE (6)	reduced sugars (7)	organic matter (8)
L ₂ (9)	\bar{x}	288,4	174,7	16,1	336,5	107,3	373,4	16,9	892,7
	s	6,5	3,0	1,2	21,8	5,6	18,2	2,1	5,6
	v	2,3	1,7	7,4	6,5	5,2	4,9	12,1	0,6
variant(10)									
K ₂	\bar{x}	277,9	163	21,6	348,9	114,0	352,5	5,2	886,1
	s	3,0	2,8	0,7	5,1	2,8	3,0	1,3	2,8
	v	1,1	1,7	3,3	1,5	2,4	0,9	24,4	0,3
A ₂	\bar{x}	293,6	176,4	20,5	321,9	113,5	367,8	17,1	886,6
	s	1,2	2,8	0,6	7,7	4,6	6,6	4,9	4,6
	v	0,4	1,6	3,0	2,4	4,1	1,8	28,7	0,5
P ₂	\bar{x}	285,6	166,3	19,4	350,2	117,6	346,4	1,4	882,4
	s	1,4	3,6	0,6	12,2	1,2	8,8	0,2	1,2
	v	0,5	2,2	3,0	3,5	1,0	2,5	14,2	0,1

6) NFE– nitrogen free extract, (9) wilted alfalfa, (10) lower content of DM – treatments: K₁ – control, A₁ – with formic acid, P₁ – with lactic acid bacteria

Table 4 Significance of differences in nutrient content in alfalfa silages with higher content of dry matter

	K ₂ :A ₂	K ₂ :P ₂	A ₂ :P ₂
dry matter (1)	+++	++	+++
crude protein (2)	+++	-	++
fat (3)	-	++	+
fiber (4)	+	-	++
ash (5)	-	+	-
NFE (6)	++	-	++
reduced sugars (7)	++	+++	++
organic matter (8)	-	+	-

(6) NFE – nitrogen free extract, - non-significant, + significant P < 0,05,
 ++ significant P < 0,01, +++ significant P < 0,001

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ANATOMICAL STUDY OF MALE GENITAL APPARATUS IN ONDATRA

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Summary

Four ondatra male bodies (two in formalin and two fresh corps) were used in the experiments, which were done in April. It was established that the bottom of abdominal diverticules helped by distal side of testicular ligament, which pass by the epididim, anchors the backside of the testicles. Seminal vesicles have the top curved crania-caudal. Prostate has 3 pairs of lobes that are in symmetric disposition with urethra. Bulbous-urethral glands, blackberry-shaped, communicate with urethra within fine tube. Preputial glands, have great volume, cream coloured and give of a musk good smell.

Key words: *ondatra, male, anatomy, genital apparatus.*

Ondatra is a fur bearing species relatively recent arrived in Romanian fauna, and this is the aim for what it is a little studied. Because of the economical importance of this species, and the informations penury about its biological particularities, we consider opportune to make some anatomical study regarding ondatra's male genital apparatus.

Material and methods

Studies were made in April, using 4 ondatra male bodies, two formalined and the other two were fresh. For formalining it was injected in abdominal cavity 200 ml of formalin 10%. These animals were opened after 8 days after formalin injection data.

Results and discussion

Like the other mammals, in ondatra males, genital apparatus can be systematized in three segments: *gonads*, represented by testicles, *conducting ducts (tubular portion)* composed by epididim and vas deferens, *urinary-genital portion*, made from pelvic urethra and extra pelvic one. Around the pelvic portion of urinary-genital channel, annex glands are placed: seminal vesicles, prostate and bulbous-urethral glands. Lateral of penis portion there are two preputial glands (fig. 1, 2).

Testicle is a pare organ, with ovoid shape, situated in inguinal region without to differentiate a real scrotal burse. Right testicle have longitudinal diameter expanded between 19 and 22 mm and transverse one between 13.8 and 15 mm. Left testicle have longitudinal diameter expanded between 17.5 and 21 mm and transverse one between 11 and 15 mm.

Testicles together with the epididim are surrounded by abdominal diverticle, which largely communicate with abdominal cavity, and allow the testis migration intra- and extra-abdominal cavity. The caudal-ventral extreme of each testicle is anchored in abdominal diverticulum bottom, through distal portion of testicular mezo, which pass over epididim too.

Free margin of testicle mezo includes an adipose deposit cream colored. Testicle's diverticulum is extra-abdominal prominent by 30-31 mm length on right side and 26-28 mm on left one. Diverticulum transverse diameter is between 12 and 16 mm.

The *epididim* is 34-45 mm long, thick, not tight beside longitudinal axe of testicle. It is anchored through terminal portion of testicle mezo. The head and tail are evidently.

The epididim is continued in cranial sense by *vas deferens* and this is opened bilateral in initial portion of urethra. It is 55-62.5 mm long and 2-2.2 mm in diameter. In abdominal portion there is a relatively abundant adipose deposit, on the suspensor ligament of the *vas deferens*.

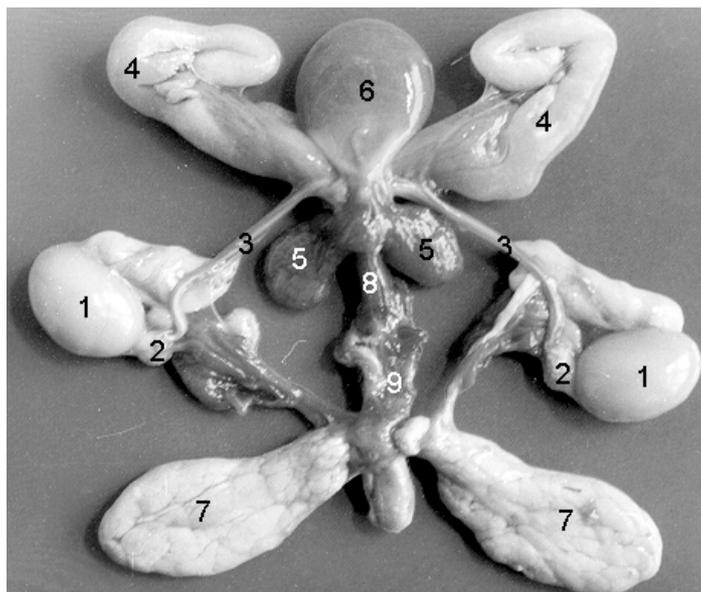


Figure 1. Male genital apparatus in ondatra. Ventral view.

1 - testicle; 2 - epididim; 3 - vas deferens; 4 - seminal vesicles; 5 - prostate; 6 - urinary vesicle; 7 - preputial glands; 8 - pelvic urethra; 9 - extra pelvic urethra.

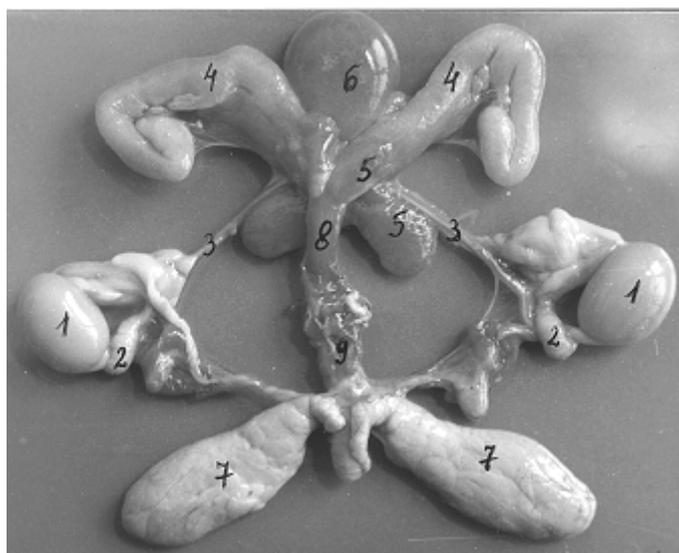


Figure 2. Male genital apparatus in ondatra. Dorsal view.

1 - testicle; 2 - epididim; 3 - vas deferens; 4 - seminal vesicles; 5 - prostate; 6 - urinary vesicle; 7 - preputial glands; 8 - pelvic urethra; 9 - extra pelvic urethra.

Urethra, urinary-genital common duct, 57-66 mm length, can be systematized in a pelvic portion (30-34 mm length) and an extra pelvic one (27-32 mm length).

Transverse diameter of pelvic urethra is 6.5 mm, and for the extra pelvic one is 7 mm.

In cranial intra pelvic portion of urethra, seminal vesicles, prostate lobes, vases deferens and urinary vesicle are opened. Between intra and extra pelvic urethra portions, at demarcation place, bulbous-urethral glands are opened.

The penis is formed by extra pelvic urethra that is the anatomical base, by two cavernous corps, a sponges corps, vases and nerves, and it have a caudal orientation in repose.

Because of sub-ischiocavernous muscle, in erection, the free extremity becomes cranial. In repose, the length of the penis is 27-29 mm and the diameter between 6.5 and 9 mm.

Ondatra males have two voluminous seminal vesicles, formed by a straight portion at the base, and a crutch-like shape proximal portion. The crutch-like shape portion is anchored on the straight one, with a mezo. Extern wall of seminal vesicles is boselated especially on concave site of "crutch". The straight portion of each gland has 62-78 mm length and between 6.5 and 9 mm in diameter. The crutch-like shape portion has 28-44 mm length and between 5 and 7 mm in diameter.

In ondatra, the prostate is a complex gland formed by many lobes symmetrically disposed with urethra sides; it has 2 ventral lobes, 2 dorsal lobes and 2 lateral lobes.

Ventral lobes, pear-like shape, have cranio-caudal orientation, and their length is between 25 and 28 mm. Dorsal lobes have 18-25 mm in length, covering basal portion of seminal vesicles on their dorsal side. Lateral lobes, named in the other species (rats) coagulant glands, are disposed on caudo-lateral straight portion of seminal vesicles, having a length of 40-60 mm. Probably, in ondatra the lateral lobes secretion determine (like in rats) the coagulation of seminal vesicle products and formation of vaginal stopper. It is no morphological evident prostate corps, in ondatra.

Bulbous-urethral glands, are pare organs, reddish, blackberry-like shape, symmetrical disposed at the passage way level between intra and extra pelvic urethra. At this last mentioned level, bulbous-urethral glands is opened through a fine duct, having 10-11 mm in length. Each lobe has between 8.5-11 mm in length and 5-7.1 mm in diameter. These glands are placed lateral by rectum, surrounded by a conjunctive tissue, between ischio-cavernous and bulbous-cavernous muscles.

Preputial glands have cream color and there are opened in preputial place, having a musk good smell. There are between 38 and 67 mm in length and their transverse diameter is between 8.8-9 mm and 15-17.5 mm at base and medio-cranial portions, respectively.

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PROTECTION OF GASTROINTESTINAL TRACT OF SUCKLING PIGLETS AND WEANED PIGS AGAINST THE INVASION OF BASIC ENTEROPATHOGENS BY PROBIOTIC PREPARATION IMUGUARD P A.U.V.

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Summary

There was performed a study with three groups of pigs (323, 324 and 312 animals in the each group) from the delivery till the age of 56 days in the pig fattening farm DONA Ltd. (Veľké Revišťa, Slovak Republic). Initially, there were used probiotic preparations on the basis of the lactic acid producing bacterium *Enterococcus faecium* M-74 containing $2 \times 10^9 \cdot g^{-1}$ germs in the form of paste (Medipharm CZ Ltd., Czech Republic): a) control group – Lactiferm paste Fe (vitamins A, D3, E and Fe^{2+} ions added), b) 1st experimental group – Lactiferm paste (vitamins A, D3, E added), c) 2nd experimental group – Imuguard P-paste (vitamins A, D3, E and IgY antibodies against pig rotavirus and *Escherichia coli* K88, K99, 987-P, F-18 added). The pastes were applied three times on the 1st, 3rd and 5th day after the delivery of pigs. There were added the following feed premixes containing the germs of *Enterococcus faecium* M-74 into the starter feed mixture COS-6118-Anprovimi for a) the 1st experimental group Lactiferm premix L-5 ($5 \times 10^9 \cdot g^{-1}$ germs), b) the 2nd experimental group Imuguard P-premix ($0.6 \cdot 10^9 \cdot g^{-1}$ germs and 920 mg pasteurized dried activated egg matter containing the same IgY antibodies as Imuguard P-paste). There were measured weight of animals immediately after the birth, on the day of weaning at the age of 28 days and at the age of 8 week. There was observed the health state of pigs and the incidence of gastrointestinal infections.

In the 2nd experimental group (preparation Imuguard P a.u.v. was applied) was lower the total number of diarrhoeic animals in one litter from 1st till 28th day of age by 20.07%, total number of injection application of antibiotic preparations by 48% from the time of delivery till the weaning, mortality of the suckling piglets by 15%. There was observed the lowest number of the diarrhoeic animals in one stall of the 2nd experimental group by 98.48% ($P < 0.05$) and the lowest mortality of the weaned pigs by 33.62% in the period from 28th till 56th day of age.

Introduction

Probiotic preparations are currently an ordinary ingredient of complete diets in which they are applied as a preventive factor against intestinal diseases and positive factor to establish eubiosis (Kumprecht and Zobač, 1998). Positive effects of probiotics on animal growth and feed utilization were also demonstrated in numerous studies. A stabilized strain of the bacteria *Enterococcus (Streptococcus) faecium* M-74 is an efficient ingredient of probiotic preparations Lactiferm and Imuguard P (MEDIPHARM CZ, Ltd., Czech Republic). The useful effect of this bacteria is supported by the IgY antibodies against the basic pig enteropathogens (pig rotavirus and *Escherichia coli* K88, K99, 987-P, F-18) in the preparation Imuguard P. The bacteria *Enterococcus faecium* are Gram-positive cocci. They contribute to sugar fermentation to lactic acid which decreases pH values of the medium to 4.0-4.6. They are a natural component of the intestinal microflora of humans, animals as well as insects. The aim of this study was to determine the relation between the applied probiotic preparation and the occurrence of the infection gastrointestinal diseases and the daily weight gains of suckling and weaned piglets.

Material and methods

The study was performed with three groups of pigs from the delivery till the age of 56 days in the pig fattening farm DONA Ltd. (Veľké Revišťa, Slovak Republic). Piglets were weaned at the age of 28 days. Swine for the production of piglets were chosen before delivery according to the principle of the random selection. There were located 32 swine into each of 3 maternity sections in the equal technological conditions. The suckling piglets (cross-breeds white generous x landras x deutsche pig) from 3 maternity sections were used in the experiment. There were born 323, 324 and 312 animals in the each group, respectively. Initially, there were used probiotic preparations on the basis of the lactic acid producing bacterium *Enterococcus faecium* M-74 containing 2×10^9 g⁻¹ germs in the form of paste (Medipharm CZ Ltd., Czech Republic): a) control group - with the addition of vitamins A, D3, E and Fe²⁺ ions (Lactiferm paste Fe), b) 1st experimental group - with the addition of vitamins A, D3, E (Lactiferm paste), c) 2nd experimental group - with the addition of vitamins A, D3, E and biological substance containing IgY antibodies against the basic pig enteropathogens - pig rotavirus and *Escherichia coli* (K88, K99, 987-P, F-18) (Imuguard P-paste). The probiotic pastes were applied three times on the 1st, 3rd and 5th day after the delivery of pigs. There were added the following feed premixes containing the germs of *Enterococcus faecium* M-74 into the starter feed mixture COS-6118-Anprovimi (nitrogenous compounds 180g.kg⁻¹, metabolizing energy 13 MJ.kg⁻¹, fiber 30-45 g.kg⁻¹, lysine 11.5 g.kg⁻¹, methionine + cysteine 6.5 g.kg⁻¹): a) for the 1st experimental group Lactiferm premix L-5, 5×10^9 g⁻¹ germs (500g.t⁻¹ feed), b) for 2nd experimental group Imuguard P-premix, $0.6 \cdot 10^9$ g⁻¹ germs and 920 mg pasteurized dried activated egg matter containing the same IgY antibodies as Imuguard P-paste (3000 - 3500 g.t⁻¹ feed). The weight of animals was measured three times - immediately after the birth, on the day of weaning at the age of 28 days and at the age of 8 week. The feed and the water were available ad libitum. There were observed the health state of pigs, incidence of gastrointestinal infections as well as weight gains. The content of nutriment was measured in the used feed mixture. There were performed the analysis of some production parameters and the parameters of the health state. The statistical evaluation of the achieved results was performed with the analysis of variation.

Results and discussion

The results demonstrated in Table 1 showed that the both experimental groups of suckling piglets supplemented with the probiotic preparations exhibited a reduced incidence and severity of diarrhoea. The average number of diarrhoeic animals in one litter was lower in the experimental groups (5.74, 6.97) in comparison with the control group (8.72). However, the number of injection applications of antibiotic preparation was lower in the both experimental groups (59, 39) than in the control group (75) from the time of delivery till the weaning.

As far as the occurrence of the diarrhoea in the individual weeks is concerned, the first diarrhoeic animals occurred in the control and in the 1st experimental group in the 2nd week of age. There was observed the statistical difference between the means (65, 8) of the control and the 1st experimental group ($P < 0.05$). On the other contrary, the first diarrhoeic animals were observed in the 2nd experimental group in the 3rd week of age (Table 2).

The percentage of mortality in the 2nd experimental group of suckling piglets was lower (17.63%) compared with the control group (20.74%). As for the weaned pigs, the average number of diarrhoeic animals in one stall was higher in the control and in the 1st experimental group (13.14, 8.33) than in the 2nd experimental group (0.20). The statistical difference was ascertained between the control and the 2nd experimental group ($P < 0.05$). The percentage of mortality in the experimental groups which feed was treated with the probiotic preparations was lower (4.31%, 3.89%) in comparison with the control group (5.86%). The probiotic preparation Imuguard, used in the 2nd experimental group, has a beneficial effect in the prevention and treatment of specific pathologic conditions in the digestive apparatus. There are probably more mechanisms by which the mentioned probiotic enhance the intestinal health, including direct and indirect stimulation of immunity, competition for limited nutrients, inhibition of epithelial and mucosal adherence of pathogenic bacteria as well as inhibition of epithelial invasion. Some of them can be a topic for our future study. The evaluation of the health state data of the animals in the 2nd experimental group indicated that the combination of the probiotic preparation consisting of lactic acid bacteria

Enterococcus faecium M-74 with the biological substance containing IgY antibodies against pig rotavirus and Escherichia coli (K88, K99, 987-P, F-18) are more effective for the prevention of the diarrhoea caused by the mentioned basic pig enteropathogens than the probiotics based only on the lactacidogenic bacterial cells.

Table 1: The health state and the weight gains of pigs

Parameters	unit	group		
		Control	1 st Exp	2 nd Exp
Suckling pigs(1 st day)	pcs	323	324	312
diarrhoeic pigs in one litter	pcs	8.72	5.74	6.97
	SD			pcs 4.52 1.32 1.69
total antibiotic treated animals (inj.)	pcs	75	59	39
mortality	%	20.74	21.29	17.63
starting weight	g	1595	1571	1499
SD	g	255	165	200
daily gain	g.day ⁻¹	241	241	237
SD	g.day ⁻¹	12	15	12
final weight	g	6963	6989	6869
SD	g	354	516	347
Weaned pigs(28 th day)	pcs	256	255	257
diarroeic pigs in one stall	pcs	13.14	8.33	0.20*
SD	pcs	11.36	9.44	0.40
total antibiotic treated animals (inj.)	pcs	0	0	0
mortality	%	5.86	4.31	3.89
final number of pigs (56 th day)	pcs	241	244	247
daily gain	g.day ⁻¹	592	539	544
SD	g.day ⁻¹	103	44	95
final weight	g	14808	12938	13587
SD	g	2578	1730	2370

Legend: * (P<0.05)

Table 2: The average appearance of the diarrhoic state of the suckling piglets in the litters from the birth till the delivery on 28th day of age

Group	Unit	Time			
		1 st week	2 nd week	3 rd week	4 th week
Control	pcs	0	10.83	9.47	7.44
1 st experimental	pcs	0	8.00	10.38	3.67
2 nd experimental	pcs	0	0	10.08	4.91

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SUSTAINABLE DEVELOPMENT AND ANIMAL BREEDING GOALS

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The currently popular term „sustainable agriculture“ is used to represent everything from organic agriculture to agriculture maximising economic yields. A few years ago it was concluded that there were 800 published definitions of sustainable agriculture, so today there are no doubt many more (Francis, 1997). Sustainability is based on a holistic philosophy, a set of values and principles, but may also involve a specific set of practises. When trying to define animal breeding goals, it is necessary to see and describe the animals as an integrated part of sustainable production systems.

Vavra (1996) explored a philosophical discussion of sustainability and made application to sustainability of animal production systems. He suggested that sustainable systems exist in the overlap of what the current generation wants for itself and future generations, and what is biologically and physically possible in the long run. Further, the same quantity of meat, milk, eggs or fibre should be harvested indefinitely from a given land base in a sustainable livestock production system.

Environmental and economical aspects were also considered here in addition to biodiversity and ethical aspects. The new idea in the term sustainability is that environmental, genetic diversity, social and ethical aspects should be accounted for in addition to short and long term economic value.

We can hope that the diversity of views on sustainable agriculture can lead to more discussion and progress towards improved animal breeding. However, also a growing consensus is desirable for progress on theory development and practical implementation. Fortunately this consensus can be found around the elements connected to the term "sustainable agriculture", at les among those who are seeking long-term and equitable solutions to the challenge of food production. Francis and Callaway (1993) summarised these elements of sustainability:

- resource efficiency: most efficient possible use of non renewable resources, and whenever possible substitute renewable resources for those imported from outside the farm;
- profitability: economically profitable in both the short and the long term;
- productivity: maintain and enhance the productivity of all basic resources rather than destroying or degrading them;
- environmental soundness: minimal negative impact both on the farm and beyond the farm borders;
- social viability: equitable systems favouring owner/operator farms, contributing to viable rural economy, infrastructure and community, supporting and integrating with overall society.

Francis (1997) lists probable characteristics of future agricultural systems. Some of his characteristics and other future development trends we find relevant to animal breeding. These are together with potential animal breeding strategies given in Table 1.

Many of the potential animal breeding strategies mentioned refer to a broader definition of breeding goals, not criming at higher production levels per animal only, but balancing higher productivity with improved functional traits, like health, fertility and feed intake capacity.

Sustainable production systems are adjusted to the local natural and social conditions. Recognition of differences in cultural/social aspects between regions, but also in natural circumstances, enhances the differentiation in breeding goals. Especially when considering the increased privatisation of breeding companies and increased world wide trade of breeding stock, differentiation in breeding goals is important for maintenance of world wide genetic variability in domestic animals (Hammond, 1993). Not only heterogeneity of production circumstances among regions, countries or individual farms, but also uncertainty and associated risk about future circumstances are incentives to differentiate between breeding goals and to maintain different breeding stocks.

Genetic improvement is a biological and technological development. The essence of these developments is to improve the efficiency of a production system: saving inputs of production factors per unit product and a change towards use of cheaper production factors. Different constraints on the production system give rise to alternative uses and therefore alternative values of saved production factors. Therefore breeding for high input systems in the developed countries only is not sufficient, nor is it culturally and socially acceptable to simply transfer such high input systems to developing countries together with the breeding stock. Table 2 summarises important traits which should be emphasised in a breeding goal according to the environmental stress and feed constraints of the production system. When the feed resources are constrained, feed efficiency traits become more important, whereas adaptation, health and functional traits are more critical for systems with high environmental stress. Again, adaptation to local natural and social conditions is important.

An additional reason to differentiate between breeding goals and to perform testing programmes in specific environments is genotype x environmental interaction. When wanting to improve performance in a range of environments simultaneously, general adaptation a robustness (as opposite to environmental sensitivity) of animals may become an important trait for selection.

Table 1 Probable characteristics of future agricultural systems and potential animal breeding strategies (after Olesen et al., 1998).

Characteristic of development	Animal breeding strategy
Technical and ecological aspects	
Increased human food requirement (larger population and more welfare) components; improve product quality	Increase production and productivity; higher efficiency per unit product; increased intake and utilization of non-human-food
Higher energy and nutrient costs	Improve utilization of local feeds; reduce costs by improved health, fertility and other functional traits;
More use of marginal land	increase intake of (bulky) roughage, and adaptation to low energy-input systems
Diversification in systems adapted to specific locations and conditions	Reduce environmental sensitivity of animals (increased robustness and capacity of adaptation); diversification of breeding goals
Regulations on elements like Nitrate and Phosphate	Increase biological efficiency in broader terms (not only energy, but also protein and minerals/elements)
Reduced use of chemical medications	Improve genetic disease resistance in general and tolerance to particular infections and parasites
Gene-and biotechnology methods	Introduce more risk averse strategies after high level ethical considerations; aim at low inbreeding and maintain genetic diversity
Cultural/social and personal aspects	
Concerns about animal welfare	Improve tolerance to metabolic stress; improve health, fertility and longevity; improve/maintain adaptation to improved management systems (e.g. floor systems for hens).
Use of intellectual property rights	Alliances and co-operation; competitive associations
Increased concern on animal-mediated human diseases	Improve genetic disease resistance in general and tolerance to particular infections and parasites
Privatisation of breeding companies, international trade, increased competition	Alliances and co-operation; competitive associations with local or market oriented and diverse breeding goals, including cultural/social aspects and recognition of personal preferences
Concerns about loss of historical, cultural breeds and genetic diversity	Develop conservation programs for breeds not under selection (in situ and ex situ); maintain or increase effective population sizes of active breeding populations, and aim for broad breeding goals

Table 2 Important traits to include in a breeding goal according to the constraints on feed resources and environmental stress of the production system (after Amer et al., 1998)

	Constrained feed resources	Unconstrained feed resources
High Environmental stress	Adaptability Feed efficiency	Adaptability Productivity
Low Environmental stress	Feed efficiency Product quality	Productivity Product quality

An important consideration when deciding on how to approach problems for sustainable systems is also the probability of solving the problem through breeding (Francis, 1997). The fewer the number of genes, the less antagonism between various important traits and the less environmental influence, the greater is the probability of success in breeding. Also, other technical and practical solutions should be considered, as genetic change is a long term and complex process. Animal breeding has so far focused on cumulative short term genetic change, because breeding optimisation has to a very large extent been based on market economy. Many examples show that animal breeding has led to unwanted side effects, which are in conflict with sustainable agriculture.

Sustainable animal breeding is a long term and complex process and therefore we need more focus on long term biological, ecological and sociological solutions.

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ANALYSIS OF BLOOD SERUM POLYMORPHIC PROTEINS IN JAPANESE QUAIL.

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Summary

In three pedigree recorded lines of Japanese quail divergently selected for low and high concentration of yolk cholesterol we analyzed polymorphism of blood serum proteins. The birds of F₁₀ and F₁₁ generation were used for this analysis. The average number of adult quails were 30 males and 60 females for every lines. For genetical mapping were used blood serum of 7 and 6 birds of LCH line, 8 and 7 birds of HCH line and 10 and 6 birds of CCH line from F₁₀ and F₁₁ generations respectively. The electrophoretic picture of blood serum albumins showed monomorphic homozygous AA combinations of all selected lines. In the transferrin locus we found in two birds of low cholesterol line genotype B. In all other birds and lines we found only genotype AB. In the albumin system of F₁₁ generation we found genotype AB in all blood serum protein samples. We found similar situation also in transferrin locus because of monomorphic combination of BB genotype in all tested samples of all lines.

Key words: Japanese quail, blood serum proteins, polymorphism, yolk cholesterol selected lines

Introduction

The progress of biochemical genetics in the recent years brought many theoretical information. Some of them influence also the practical breeding work of large animals, poultry and Japanese quail which is used not only for poultry and biomedical research, but also for commercial purposes because of their biological and economical value.

The genetic polymorphism of Japanese quail was studied by several authors. Kimura (1989) studied the influence of domestication process on polymorphic proteins of wild *Coturnix* populations. He found electroforetic variability of 32 protein and enzymatic loci in wild quail population which was after the catching in the wildness, reared in domestic environment without artificial selection during 15 years period. After this period of domestication, the gene frequency of domesticated formerly wild population was very similar to the commercial populations of Japanese quail but significant different from their wild ancestors. Ghosh et al (1992) studied biochemical polymorphism on the Hb locus of three lines of Japanese quail (German, meat and egg lines). All of them had codominant alleles A and B. The frequency of allele A was higher than of allele B in all of three investigated populations. The genotypic frequencies of meat lines were genetically unequal, the frequency of BB genotype was significant higher as supposed ($P < 0,05$). The two other lines were genetically identical. Kuryl (1988) analyzed the frequency of albumin and prealbumin types in blood and egg yolk in 293 Japanese quail. The progeny analysis showed that polymorphism of blood and yolk prealbumin was controlled with two pairs of codominant alleles on the autosomal locus. The electrophoretic analysis of body liquids of three lines of Japanese quail from Canadian Genetic Stock Center was made to ascertain genetic diversity selected lines with larger body weight in comparison with unselected and randomly paired populations (Cheng et al., 1993).

The aim of this paper was to evaluate the changes of genetic polymorphism of serum proteins in the lines selected to low and high egg – yolk cholesterol concentration and to compare the obtained values with the non – selected control population of Japanese quails reared in Research Institute of Animal Production Nitra – Poultry Breeding Station Ivanka prunaji (RIAP, Nitra).

Materials and methods

Two lines of Japanese quail, divergently selected for low (line LCH) or high (line HCH) and one unselected control population (CCH) of F_{10} and F_{11} generations reared in RIAP Nitra were analyzed in this experiment. All analyzed quails had agouti feather color pigmentation (e^+). The average number of adult quails were 30 males and 60 females for every lines. For genetical mapping were used blood serum of 7 and 6 birds of LCH line, 8 and 7 birds of HCH line and 10 and 6 birds of CCH line from F_{10} and F_{11} generations respectively.

The standard starch gel electrophoresis was used to analyze the samples of blood proteins. We used horizontal electrophoresis with the one – way electric current Multidrive XL – LKB Pharmacy. The starch gels were prepared with application of potato starch, which was hydrolyzed by hydrogen 0,1 N chlorhydrogenic acid (HCL) 40 minutes by the temperature 38 °C. The gels were prepared by heating of starch suspended in puffer by the temperature of 85 °C in water bath. After mixing of few minutes the liquid mass of gel was poured out into electrophoretic bowls and the next was used for application prepared samples. After electrophoretic separation, the gel was cut along into two halves. The interior cut was colored by saturated solution of amidoblack 10 B in the mixture methanol – distilled water – vinegar acid in the 5 : 5 ratio. The gels were colored about 10 minutes and the redundancy of dye was many times washed with solution of equal composition but without the dyes. After the finishing of electrophoretic separation, the proteins fraction results were statistically evaluated.

Results and discussion

The electrophoretic results of blood serum polymorphs proteins and the statistical comparison between the evaluated lines are shown in Tables 1.

The electrophoretic picture of blood serum albumins of F_{10} generation showed monomorphic homozygous genotype AA combinations in all analyzed birds of all analyzed lines. This reality was probably caused by relative high frequency of A allele.

We recorded the identical genotypes AA albumins in all three tested lines of F_{10} generation. Which is in conformity with results of Baumgartner et al (1997).

In blood serum transferrin locus of F_{10} generation we found in low cholesterol line 2 birds BB genotype as results of one allele TfB. In low high cholesterol lines and also control line we found in 71,43 % of analyzed birds the AB genotype, what showed on the existence of two different alleles TfA and TfB in the blood transferrin locus. In the high cholesterol line was separated monomorphic genotype combinations AB in all analyzed blood serum samples of analyzed birds.

In albumin system of analyzed lines in F_{11} generation we found AB genotype in blood samples, which is caused by presentation of two alleles AlbA and AlbB. our finding closely correspondent with results of Ghosh (1992) who studied polymorphism of three populations (German, meat and egg lines) of Japanese quail. in all tested populations he found two codominant alleles A and B. The frequency A was higher as frequency B in all analyzed lines. Similar results reported Kuryl (1988) who declared that polymorphism of blood serum albumin of Japanese quail is controlled by the pair of codominant

alleles on the autosomal locus. In analyzed samples we did not found the homozygous genotype CC and also its heterozygous combinations, which was probably caused by low frequency of allele C. Our results correspond also with Mazumder and Mazumder (1990) who did not found homozygous CC genotype or their heterozygous combinations and transferrin subunits B₁C₁.

In the blood transferrin locus of F₁₁ generation we recorder in all analyzed lines only one homozygous genotype combinations BB.

Our results are similar to Kosak et al. (1989) and Asala et al. (1993), who did not found in three strains of Japanese quail differences in the transferrin Tf genotype frequency.

Table 1 Polymorphism of blood serum proteins of Japanese quail. LCHL = low cholesterol line, HCH = high cholesterol line, CCH = non selected control line

Line	Bird s number	F ₁₀			Bird s number	F ₁₁	
		Albumins		Transferrins		Albumins	Transferrins
		AA	AB	BB		AB	BB
LCH	4008	1	-	1	2003	1	1
	4105	1	-	1	2011	1	1
	4107	1	1	-	2013	1	1
	4108	1	1	-	2017	1	1
	4145	1	1	-	2100	1	1
	4013	1	1	-	2028	1	1
	4026	1	1	-		1	1
HCH	4809	1	1	-	2926	1	1
	4810	1	1	-	2937	1	1
	4836	1	1	-	2909	1	1
	4855	1	1	-	2934	1	1
	4859	1	1	-	2935	1	1
	4841	1	1	-	2913	1	1
	4907	1	1	-	2918	1	1
	4888	1	1	-		1	1
CCH	4174	1	1	-	2314	1	1
	4176	1	1	-	2478	1	1
	4180	1	1	-	2487	1	1
	4185	1	1	-	2324	1	1
	4192	1	1	-	2417	1	1
	4197	1	1	-	2418	1	1
	4202	1	1	-			
	4212	1	1	-			
	4216	1	1	-			
	4226	1	1	-			

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