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STRATEGY OF HYBRIDIZATION PROGRAMMES IN PIG BREEDING IN THE CZECH REPUBLIC

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Pig breeders and producers in all advanced countries with high level of animal breeding require objective informations on the quality of fattened pigs from different hybridization programmes. Besides the farm testing these informations should be verified under individual conditions of environment, rearing, nutrition and under more exacting evaluation of the slaughter value of animals tested. Usually for these purposes one testing station having adaquate capacity and its own slaughterhouse and laboratories is used. In our conditions these requirements for this form of testing were worked into the amended Czech State Standard No. 46 6164 - Performance recording and progeny testing of pigs - and in methodical implementing regulations with effect from 1.1. 1995.

Realization of the foreign hybridization programmes in Czech Republic, Ministry of Agriculture, CzR, in compliance with the law of Czech National Council No. 240-1995 Coll., section III, article 19, paragraph 2, conditioned by this testing according to the conforming methodology. At present, in whole 19 subjects submit their programmes in Czech Republic, out of it 15 domestic and 4 foreign, so-called firm programmes. In our contribution we want to make acquainted all those potentialy interested in testing, professional public, breeders as well as producers of fattened pigs with the organizational and methodical strategy of verification of hybridization programmes under the conditions of Czech Republic.

The purpose of newly introduced testing is the objective verification and mutual comparison of fattened final hybrids from different domestic and foreign hybridization programmes on the characters of fattening capacity and slaughter value. Ministry of Agriculture CzR put the Central Testing Station of Pig Hybrids (hereinafter CTSHP) in Hlavečnik, district Pardubice in charge of this activity which has adequate capacity for this purpose (daily slaughter

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capacity 60-80 pigs), laboratories, professional technical equipment for the evaluation by EUROP system and all the working prerequisites. Besides the convenient location (almost in the centre of Czech Republic) there were created all the conditions for compliance with strict veterinary measures. Ministry of Agriculture put the State Breeding Station in Prague, as an independent organization to participating subjects, in charge of methodical and organizational coordination of this testing. The State Breeding station elaborates methodical procedures of testing, prepares the harmonogram of placing pigs from different programmes, carries out the professional supervision of the correctnes of the testing according to the methods approved, organizes the controlling days, elaborates and publishes the test results achieved. The testing of each programme is performed in two year cycles, all the hybridization programmes being subject to it and according to them fattened final pig hybrids are produced. The testing programmes are celected by Czech Inspection for Selective breeding (hereinafter Czech Inspection). The owner of the relevant hybridization programme obtains the certificate on the testing performed from the Czech Inspection as so-called test of goods. For the purpose of objective testing of final hybrids of the concurrent hybridization from one hybridization programe, not less than 60 animals must be tested for fattening capacity and slaughter value. The number of animals tested and the date of their placing into the testing station is determined on the basis of negotiations and aggreement with organizations (firms) concerned and goes by harmonogram approved. The animals selected for testing must be marked in durable manner (i.e. by tatooing or notching) and provided with adequate documents of origin and health status. All the requirements about the origin and quality of piglets as well as the veterinary conditions must be fulfilled. The documents on origin of pigs must contain: pig hybridization (breeding or line combination of crossing), ear number of pigs and their date of birth, father and mother of each animal (their ear number, number of state register and date of birth of fathers). The veterinary certificate must certify, that the herd is free from the infectious diseases and all the required health tests were performed, namely for tuberculosis, brucellosis, Aujezsky s disease and hog cholera (once a year). In CTSHP the consistent protection against hog cholera is secured. Always, when the animals are taken out very careful mechanical cleaning and final disinfection is performed. In case when fattened final pig hybrids are imported from abroad to be tested in our conditions, the conditions for import are laid down by the State Veterinary Service of CzR, quarantine measures and health check up during the quarantine period are set up by the District Veterinary Service.

A. *Fattening Capacity Determination*

Only healthy, well developed and according to the method selected pigs can be included in testing:

a) in one group of concurrent hybridization there should not be less than 30 guilts and 30 barrows (castrates). In case of higher number of animals tested the sex ratio 1 : 1 is required

b) the group originates from at least five fathers

c) the live weight of pigs placed may vary from 20 to 28 kg.

In CTSHP the pigs from one programme are placed into pens by 10 heads. The fattening capacity test of fattened final pig hybrids is performed from the mean live weight 30 kg of the pig group for the period 105 days, +/- 4 days. The characters of fattening capacity and slaughter value observed are corrected by correction coefficients which were determined on the basis of regression analysis for uniform live weight of 100 kg. In case that the test is completed with lesser number of animals than sixty, the correction is done to the sex ration. During the entire period of test fattening, the pigs are fed in a uniform feeding system. The feed mixture and water intake is ad libitum from the self-feeders and from the automatic drinking bowls. The feeding mixture is the uniform mixture GENT which is in the course of the test analyzed for health suitability, nutrient and energy content.

The nutrient value of this complete feed mixture is on the top European feed mixture level produced for the same purposes. The mixture GENT was subjected to exacting verification of production effectiveness in our conditions by SPP Praha, Research Institute of Pig breeding in Kostelec nad Orlici and Research Institute of Animal production in Uhříněves. After the procedure of verification it was declared by Central control and Testing Agricultural Institute in Prague and at present it is produced according to the following prescription:

Raw material composition (percentage of components used).

wheat	33 - 36 %
barley	42 - 45 %
soybean meal extr.	15 - 18 %
fish meal	6 %

registered biofactor premix for the test

fattening of pigs from 30 to 100 kg live weight

registered mineral premix

Requirements on the quality of GENT mixture (minimum nutrient and specific effective matters content):

Crude protein	18 %
ME	12,8 MJ/kg
Crude fibre	3,3 %
Lysin	1,1 - 1,3 %
Methionin + Cystin	0,6 %
Ca	0,85 %
P	0,65 %

Besides the requirements on securing uniform high quality nutrition of pigs tested there are specified conditions for creation and maintenance of required microclimate in CTSHP. Requirement on microclimate in CTSHP:

Live weight	Temperature C			Relative humidity %	
kg	min.	opt.	max.	max.	opt.
30 - 50	14	16 - 22	28	80	50 - 70
50 - 90	10	14 - 20	26	85	50 - 80
over 90	8	10 - 16	24	85	50 - 80

B. *Slaughter Value Determination*

The cardinal importance of the hybridization programmes testing lies in exacting evaluation of the slaughter value of fattened hybtids. The quantity and quality of pork which is the final product of each programme is interesting both for producer and processor but above all for the consumer. For these reasons the further part of this contribution will pay attention to this problem.

After completing the testing period the pigs in the CTSHP are slaughtered in the local slaughterhouse. Within thirty minutes after slaughter each animal is cleaned, eviscerated, split into two halves and weighed with the accuracy of 0.5 kg. The difference between the left and right half must not be higher than 1 kg. The live weight before slaughter found at the slaughterhouse and the weight of the halves including the head without the brain and internal organs of the thoracic abdominal and pelvic cavity, but with kidneys and kidney fat, serve as the basis for dressing percentage calculation. The back-fat thickness of the slaughtered final hybrids is measured at the last rib.

After slaughter the pH value of meat of the musculus longissimus dorsi (pH 1 and pH 24) is measured in fixed intervals. On the basis of pH value of meat the occurrence of meat defects is found according to the table of extreme values:

Extreme pH values of meat:

Values	pH_1 of meat (45 min. after slaugh.)	pH_{24} of meat (24 hours after slaugh.)
normal meat	5.81 and higher	-
PSE meat	5.80 and lower	-
DFD meat	-	6.20 and higher

Before measuring the pH of meat and approximately after 5 - 10 measurements, the accuracy of measuring must be checked up by means of pH buffers. The first solution used for this purpose must be close to the isopotential point of the electrode (pH) and the second solution must be close to the expected pH value of the sample.

The second day after slaughter and cooling to the temperature 2 - 5 C°, both halves are weighed with the accuracy of 0.5 kg. Then the right halves without the tail of all the pigs tested at the station are cut and following values are followed:

a) *slaughter carcass lenght* is measured on the half hanging by the steel tape from the front margin of symphysis pelvis to the front margin of the cervical vertebra,

b) *back-fat thickness* is measured by vernier caliper with the accuracy of 1 mm from the outer skin margin to the upper margin of the layer sepparating the back fat from the muscle towards:

measurement No. 1 - the centre of the second thoracic vertebra

measurement No. 2 - the centre of the last thoracic vertebra

measurement No. 3 - the centre of the first sacral vertebra.

These three measurements serve as the basis for calculation of the average thickness of the back fat.

c) *main meat parts*

The right half of the carcass without the tail is cut into the neck, loin, shoulder without the front knee and the ham on bones. The cuts are weighed with the accuracy of 0.02 kg. The separation of the fat coverage from the neck, loin, shoulder and ham is valid for the purposes of pig testing on VJH according to these instructions only.

Neck is separated from the loin behind the sixth thoracic vertebra, on the outer surface has no fast coverage.

Loin is separated from the neck behind the sixth throracic vertebra from where the loin and belly is cut upright to the backbone. Belly is separated from the loin 1 cm from the musculus iliocostalis. The ribs must not be longer than 5 cm, measured from the upper margin of the main muscle of the loin. On the

fresh cut of the musculus longissimus dorsi behind the last thoracic vertebra the surface of the eye of musculus longissimus dorsi is drawn and measured as well as the fat surface. The back-fat is separated from the loin so that the outer surface of the loin has no fat coverage.

Shoulder on bones without the knee is separated from the front part of the carcass by a circular cut of surface pectoral muscles and of rare fatty tissue. The scapular cartilage is broken off and the shoulder is cut so that the cartilage remains with the front portion of the carcass. The entire outer surface of the shoulder must be without the fat coverage. The feet are separated from the shoulder at the undermost part of the carpal joint, the knee is cut off in the elbow joint so that the olecranon remains with the shoulder.

Ham on bones. Ham is separated from the front part by a straight cut upright to the backbone between the last (7th) and 6th lumbar vertebra. From the ham, "paždík", sacral bone, foot cut off in the undermost part of the tarsal joint, the knee cut off upright to the knee joint (patella) are separated. The ham is trimmed from skin and fat so that it remains without the fat coverage.

Ham on bones worked into the shape without the knee and the sacral bone is weighed. The weight is added to the weight of the neck, loin and shoulder on bones without the knee. The total weight of these portions represents the percentage of main meat parts of the carcass half.

The share of the lean meat and the carcass classification of the pigs tested is determined by means of FAT-O-MEAT-er. The FOM method determines the thickness of muscles and fat on the right half of the carcass paramedialy from the line of splitting cut by using the stab probe which makes use the principle of light beam reflexion. The muscle thickness (M) and fat thickness including skin (S) is measured 70 mm from the line of the splitting cut on the level between the second and third last but one rib, that is by one stab.

The share of lean muscles y_1 in % calculated according to the formula:

$$y_1 = 81.8909 + 0.2006\ M - 14.1911\ \ln S$$

where M is the muscle thickness in mm,
S is the fat thickness including skin in mm,
ln is natural logarithm.

Fattened final hybrids from the hybridization programmes are classified according to the EUROP system as follows:

Classification	Share of lean meat requirements
E	55 and more %
U	50 - 54.9 %
R	45 - 49.9 %
O	40 - 44.9 %
P	less than 40 %

The above mentioned descriptions of the methods used for determination of slaughter value exludes the possible speculations in different approach to evaluation of pigs between the individual hybridization programmes, eventually between Czech Republic and EU countries. Nevertheles we want to state that besides this basic testing the Czech University of Agriculture in Prague is engaged in so-called superstandard investigations into further characters of slaughter value of pigs in Czech Republic. As an example serves the investigations into the share of intramuscular fat, binding capacity of water, colour and electric conductivity of muscles with respect to pH values, event. biopsy and determination of energetic metabolism of muscles.

Veterinary services also participate on the classification control of the fattened pigs in CTSHP. Veterinary surgeon performs the clinical examination of the health status with respect to the hereditary conditioned nature of morphological defects before slaughter and pathological changes in accordance with fattened animal examination and meat inspection after slaughter. The findings are evaluated with respect to the health heredity. The clinical and pathological findings of each prematurely condemned pig before reaching the fixed slaughter weight are included into general health evaluation of the group of pigs.

C. *Results procesing*

The results on fattening capacity and slaughter value are computer processed according to the special programme.

The characters evaluated contain following traits:

a) mean daily weight gain from birth and during testing in g,

b) GENT feed mixture consumption and metabolizable energy on 1 kg of live weight increase in kg,

c) corrected carcass lenght in cm,

d) musculus longissimus dorsi area in sq. cm,

e) share of main meat parts of the carcass half in % - neck, shoulder, loin, ham (% MMP),

f) share of meat of the ham from the carcass half in %,

g) back-fat thickness behind the last thoracic vertebra (fresh carcass) in cm,

h) mean back-fat thickness in cm,

ch) meat quality on the basis of changed pH values or of further physical and chemical values investigated,

i) classification according to the EUROP system (share of lean meat in %).

The results of testing of fattened final pig hybrids under the names of individual hybridization programmes are published every year as a national overwiev.

STRATEGIJA HIBRIDIZACIJE U SVINJOGOJSTVU U ČEŠKOJ REPUBLICI

Sažetak

Uzgajatelji i proizvođači svinja u svim naprednim zemljama s visokim stupnjem uzgoja životinja trebaju objektivne informacije o kvaliteti tovljenih svinja iz raznih programa hibridizacije. Osim testiranja na farmi ove bi informacije trebalo provjeriti u pojedinim uvjetima okoliša, uzgoja, prehrane i preciznijom ocjenom klaoničke vrijednosti testiranih životinja. U te se svrhe obično upotrebljava stanica za testiranje koja ima odgovarajuće mogućnosti i vlastitu klaonicu i laboratorije. U našim uvjetima ti su zahtjevi testiranja ugrađeni u amandman Češkog državnog standarda br. 46 6164 - i u metodičko implementiranje propisa sa stupanjem na snagu 1.1. 1995. Ocjenjene karakteristike sadrže sljedeća svojstva:

a) srednji dnevni prirast u težini od rođenja (poroda) i za vrijeme testiranja u g.

b) Potrošnja krmne smjese GENT i metabolizirana energija na 1 kg povećanja žive vage u kg,

c) korigirana dužina polovica u cm,

d) površina musculus longissimus dorsi u cm^2,

e) udio glavnih mesnih dijelova u polovicama u % - vrat, rame, but (% MMP),

f) udio mesa buta svinjskih polovica u %,

g) debljina leđne slanine iza posljednjeg rebra (svježe polovice) u cm,

h) srednja debljina leđne slanine u cm,

ch) kvaliteta mesa na osnovi promijenjene vrijednosti pH ili ostalih istraživačkih fizičkih i kemijskih vrijednosti,

i) klasifikacija prema sistemu EUROP (udio krtog mesa u %),

Rezultati testiranja tovljenih hibrida svinja pojedinih programa hibridizacije objavljuju se svake godine kao nacionalni pregled.

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