

National Genetic Evaluation Systems in Germany

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1 Introduction

Statistics for weaner production over the last few years in Germany clearly show a continuous decline in the use of purebreds and an increase in the use of crossbred piglets. Most of the crossbred piglets (about 60 percent) are produced by breeding companies. About 20 different breeding companies are established in Germany. Besides these breeding companies the former pedigree breeders have also set up crossbreeding programs. The structure of these so called breeding organisations is similar to the structure of breeding companies but the testing schemes are different. Because there are so many different breeding programs available in Germany the need for independent evaluation of the available stock has become much more important and is part of the official registration procedure of breeding companies and breeding organisations there. To maintain this registration it is compulsory for every breeding program to take part in one independent product evaluation every 3 years. In this paper the basic principles of testing schemes and the protocols for this independent product evaluation are discussed.

2 Structure of breeding programs

About 90 percent of all market pigs are the product of three or four-breed crosses. Because the average farm size in former Western Germany is about 60 sows, the industry structure to produce these final crossbreds is made up of several stages on different specialised farms (nucleus, purebred multiplier, crossbred multiplier, weaner production and finishing farms). Some of the bigger units in former East Germany are used as multiplier or weaner production farms. The breeding companies are often the owner of their nucleus farms and they have full control (selection and marketing) over the multiplier farms. Within breeding organisations the production of purebred replacements and the production of F1 gilts and boars is done on the same farm with the selection controlled by the organisation. The production of the final market pig is done in specialised weaner production farms for both the breeding companies and the breeding organisations. Some weaner production farms are also finishing their final products while others sell them to specialised finishing farms. The bigger breeding companies often have their own AI stations, and within the nucleus and the purebred multiplication level 100 percent AI is used, while the other levels use between 20 and 60 percent AI. Within the breeding organisations only 10 to 20 percent AI is used with an increasing trend towards higher usage.

3 Testing procedures

To evaluate their breeding stock within breeding companies and breeding organisations three groups of animals are tested:

- young boars
- gilts
- full- and/or half sibs of boars and gilts.

Most of the breeding companies test their young boars under station test conditions with single housing and ad lib feeding so they get information on average daily gain, feed conversion and ultrasonic backfat measurements. Within breeding organisations the young boars are tested at a weight of 120 to 140 kg for lifetime average daily gain and backfat thickness either on farm or on auction sales. Different housing and feeding systems that have been used are ignored. Gilts are tested in both companies and organisations at a weight of about 90 kg for lifetime average daily gain and backfat thickness. These gilts are raised in groups under normal farm conditions.

To obtain information about carcase traits full- and/or halvesibs of boars and gilts are slaughtered. The breeding organisations have access to central test stations where two female fullsibs are fed ad lib from 30 to 100 kg of weight. The commercial breeding companies use special farms to feed sows and castrates under normal feeding systems in groups of 6 to 12. At slaughter various meat quantity and meat quality traits are measured for both testing schemes.

4 Estimation of breeding values

Index selection and BLUP (Best Linear Unbiased Prediction) are used to evaluate breeding values for boars and gilts. The breeding organisations still use selection index procedures including an animal's own performance measurements and sib information (see 3) to calculate the selection criteria. No litter information is used in these indexes, although litter size at birth and weaning is included in their recording systems. Some breeding companies use BLUP procedures to select their breeding stock using multiple trait animal models. Within these BLUP evaluation systems litter size is also included. Different economic weights for the main traits in the breeding goal are used for sire and dam lines to calculate an overall economic index for selection.

5 Commercial product evaluation

Even before the commercial product evaluation of slaughter pigs became part of the registration procedures of breeding programs one central test station developed a test of final products which is known as the "Haus Duesse Warentest". This is the best known and highly accepted station test of slaughter pigs in Germany with 6 tests finished to date (7 breeds each test). In the last 4 tests a field evaluation of reproduction traits was included. Similar tests have also been initiated in other central tests stations. 100 final products of each company or breed are chosen by station personal and tested between 30 and 100 kg liveweight under restricted and ad libitum feeding (50 pigs each) in double penning (two fullsibs of one sex, sows or castrates). The sample needs to be from 20 farms per breed and a maximum of 10 pigs per sire are chosen.

All important traits are measured and the results are published. Different overall economic indexes for weaner production, finishing, and combined production are calculated. Mortality in finishing, reproduction and meat quality are included in some indexes. Reproduction traits are evaluated on farms by counting the number of sows and piglets on each selected farm (at least 20 per breed) on 2 different dates (6 weeks apart). No information is available about sow productivity over time or male reproduction traits. The first test using additional information on sow productivity traits has finished using information from sow management programs. With an increasing number of such programs used in Germany this should become a cheap method of evaluating reproduction traits across breeds.

In the following table some results of the Haus Duesse Warentest are shown including only percent lean meat, the overall economic index and the ranking of breeds according to the index. The index is shown as the deviation of the mean of all participants.

Breed	Year	Percent meat	Index	Ranking
BHZP	1982	50.1	8.28	1
	1985	51.8	12.27	1
	1988	52.3	4.50	2
	1993	55.2	-1.66	5
PIC	1982	50.9	7.36	2
	1985	50.3	10.19	2
	1988	50.8	-1.60	5
	1989	51.1	-11.12	6
PI*(LW*LR)	1982	51.7	-3.63	3
	1985	53.2	-2.82	4
	1988	54.4	12.17	1
	1989	54.5	3.22	3
	1993	55.3	.30	4

This type of commercial product evaluation is highly accepted but the problem of possible genotype environment interactions might exist given different feed and housing regimes. The evaluation of mortality in finishing is poor using a station test in the explained form.

In summary this form of commercial product evaluation is a good possibility for weaner production and finishing farms to get an overview about the different breeding programs. There are some developments discussed in Germany to increase the accuracy in evaluating reproduction traits and mortality in finishing which is very important for economic calculations.

An on-farm test using electronic identification systems might help to overcome the discussion about interactions mentioned above. The first evaluation of reproduction traits using herd recording systems seems to be promising.

