

## EUROPEAN PORK PRODUCTION AND ITS QUALITY IN THE FUTURE

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### 1. INTRODUCTION

In order to get insight in future developments of pork production it is important to assess the determining interrelationship between different quality and quantity aspects. In this paper the situation in Europe in this respect is discussed.

### 2. THE CONCEPT OF QUALITY

The concept of quality is a collective idea built on quite different elements and definitions. Certain sub-criteria can be discussed scientifically, because these sub-criteria can be determined objectively. Colour, for instance, can be described by remission or according to a certain system of grades. In this way it is also possible to give concrete information based on certain criteria about slaughter quality and meat quality. However, not all quality criteria can be assessed in a systematical way, because the elements are not of an easy determinable nature. Attention will be given to genetic and environmental effects on: slaughter quality, meat quality, fat quality, quality of meat products and their interrelationship.

### 3. THE SITUATION AT THE MOMENT

#### 3.1. Slaughter quality

The slaughter quality is determined by: dressing percentage, meat/fat ratio (backfat thickness), conformation and slaughter weight. A negative relation seems to exist in most breeds between an excellent slaughter quality and the meat quality in the sense of PSE. This will be documented later on.

#### 3.2. Meat quality

The quality of pork can be characterized by different criteria. First of all there are *tenderness, flavour and taste, colour, consistency, drip and marbling*. Beside these characteristics quality meat has to be wholesome, that means in the micro-biological and toxicological sense. The consumer favours *tasteful, tender and lean meat* with *good colour and consistency*. ZUIDAM et al. (1971) found that price, fat and weight of pork chops more than colour determined the purchase. Much research has been concentrated on quality defects which are called PSE (pale, soft, exudative) and DFD (dark, firm, dry). Not only the consumer, but also the meat industry wants a good quality, i.e. technological quality. PSE produces too much drip, has a bad consistency and a high cooking loss, especially in canned products. In DFD meat the pH after 24 hours is too high, because of a too low glycogen concentration in the muscles at the moment of killing. Because there is almost no pH decline (lactic acid accumulation) an abnormal consistency develops. The abnormal pH causes also a loss of taste and a low keeping quality (shelf-life). Blood splashes (haemorrhages) are not permitted. These haemorrhages will be found in pigs which have been stunned inadequately. Abnormal flavours originate mostly from external factors, like concentrates with too much fish ingredients (fish-meal) (WISMER PEDERSEN, 1979). The boar taint is another flavour abnormality which is the result of testosterone derivative (androstenone) together with components such as skatol, which accumulated in the fat of certain boars. This has also to be regarded as a quality defect, especially of fat.

#### 3.3. Fat quality

The quality of fat can be characterized by factors as: consistency (mostly due to the concentration of saturated fatty acids) and abnormal flavour. The backfat thickness as such is also a quality character, especially for certain meat products. The excellent meaty animals produce hardly enough backfat for the meat products and this fat is mostly not firm enough. Soft fat is sometimes the result of too high concentrations of unsaturated fatty acids in the feed (corn). In principle it is possible to change to some extent the concentration of the various types of fatty acids in the backfat by way of changing the composition of the feed. Against the background of the health of the consumer (heart disease prevention) this might be necessary (WISMER PEDERSEN, 1979).

#### 3.4. Meat products

Meat products were in the past especially products of less value. They were produced from by-products. Nowadays there is a shift to upgrading of meat parts like shoulders and other cuts. There is even a tendency towards a higher amount of raw meat consumption. This requires a high level of animal production, slaughtering and meat inspection. Meat products are nowadays considered as specialties instead of by-products. This trend will be followed more and more.

There are two opposite tendencies. The first one is that meat as such is more and more used as an industrial product, while meat products are regarded from the industrial point of view as standard mass products. The quality meat products on the other hand are made by small scale butchers (PAARDEKOOPER, 1980). This means that the original quality derived from the slaughtered animal is even more important than before.

#### 3.5. Other by-products

The pig also produces economical products as *guts* for the production of sausages, *skin* for the leather industry and *blood* as an ingredient of sausages.

Guts. No special comments about the future use will be made, insofar that the popularity of this product will

increase if labour costs can be lowered by means of mechanisation i.c. automatisisation.

Skin. The skin is more and more in demand for leather production. It can be foreseen that this demand will increase because artificial leather has not been able to replace completely the genuine leather. One has to keep in mind that the existing tendency to fatten male animals might decrease the fore-mentioned quality, because the thickness is a non-quality factor. Furthermore, there is a growing interest in deskinning as a replacement for the scalding tank, which will be energy saving and hygiene improving. In general it can be concluded that one may anticipate a spectacular increase of the use of the pig's skin for leather products.

Blood. Till now, because of veterinary restriction blood is not frequently used for consumption. However, blood has a high protein content and therefore it is clear that in the future there will be a drastic increase in use, partly stimulated by a better technical blood collection equipment.

#### 4. POSSIBLE DEVELOPMENTS

##### 4.1. General

The future development of the pork production is dependent of different conditions. The most important condition is of course the level of consumption. However, the urge to buy is directly related to the level of the economy of the country. It has to compete with other commodities. The attractiveness of this specific product in comparison with meat of other species is of special importance. There are typical characteristics of pork which make it a favoured food. 1) It is cheaper than beef; 2) It has fast-food characteristics which are very suitable in these modern times; 3) It is the basic and determining element for different specific products with their own attractiveness such as sausages and ham. A negative point is that pork is regarded as fatter than beef. There seems to be a direct link with the economy of the country. Germany with one of the hardest currencies of the world shows the highest consumption of Europe with 52 kg in 1976/1977. Environmental and energy aspects as well as an increasing resistance of the consumer against certain production methods play also an important role in determining the future perspectives of the pork production. These factors have a limiting effect on the development. If the demand of pork rises in the future a balance between promoting and limiting factors has to be set.

##### 4.2. Quantitative development

The situation of the pork consumption in Europe is that (at least in 1976/1977) the consumption ranged from 52 kg per person in Western Germany (highest) to 13 kg per person in Greece (lowest). This means that there is ample space for increase of consumption i.e. production.

##### 4.3. Genetic measures

Carcass quality and constitution. One may assume that an increase of the expected meat consumption will be linked with a shift towards a better carcass quality. Because a higher classification means more meat per carcass, this shift alone will take care for a part of the future requirements. From the breeding point of view the perspectives of an improvement of the slaughter quality seems rather good. For instance, O.K. PEDERSEN (1979) gives the following heritabilities ( $h^2$ ) for carcass and meat quality in the Danish Landrace (Table 1). From these figures it is clear that the economical important parameters like feed conversion and percentage meat in the carcass are rather good inheritable. The same seems to be true for colour of the meat.

Table 1. Heritabilities by semi ad libitum and ad libitum feeding (preliminary results)(O.K. PEDERSEN, 1979).

	<u>semi ad libitum</u>	<u>ad libitum</u>
Daily live gain	0.33	0.44
Daily meat gain	0.58	0.32
SFU/kg live gain	0.44	0.36
Meat gain/SFU	0.63	0.31
Per cent meat	0.60	0.61
Scores for meat colour	0.44	0.54
KK-index	---	0.56

STANDAL (1979) illustrated the genetic possibilities by way of a straight selection of two lines within one breed. A line with a low and a high backfat thickness respectively. In 8 generations the difference in muscle tissue % as is shown amounted up to 10 % and in fat tissue up to almost 13 %. The consequences for the food conversion are very substantial with a better one for the low fat line.

Meat quality and constitution. Constitution or viability is like quality a complex conception. It is as difficult as in the quality concept to find one criterion that determines the overall viability. Leg weakness for instance, is only a part of the picture of a lower viability. And as in the field of quality not all viability symptoms need to be interrelated.

There are several investigators who are convinced that a selection on a better carcass quality deteriorates the meat quality (PSE). The sensitivity of pigs for halothane parallels the so-called stress susceptibility. The halothane test on malignant hyperthermia syndrome (MHS) has a direct relation with the Creatine Kinase test which is used for the same goal in the USA. In Denmark some bloodgroup alleles of the H system seem more prevalent than others in halothane positive pigs. In certain (meaty) breeds exists a close relation between a bad meat quality and high death loss. One may conclude that the viability (stress susceptibility) is negatively affected in the pigs with a superior carcass quality. MINKEMA et al. (1976) suggested that we can get around this difficulty by making an endcrossing out of a halothane negative sow and a halothane positive boar, which has been selected on an excellent (homozygote) carcass quality. This suggestion is based on the conclusion derived from earlier research that the halothane gene has an additive effect on the carcass characteristics. It may be concluded that with clear genetic measures it is possible without any doubt to get a rapid improvement of the carcass and meat quality. At the same time the fat quality will move in the opposite direction.

## 5. EXTERNAL INFLUENCES ON QUALITY

### 5.1. Slaughter quality

An important improvement of the slaughter quality can be reached by eliminating the castration of male piglets. Different investigations warrant this conclusion. However, a *conditio sine qua non* for this very logical step is that there will be developed a method by which can be assessed accurately the acceptable limits of boar taint for the fresh meat product. The future perspectives are very good.

Table 2. Differences in performance between boars and hogs on ad libitum and restricted feeding level (WALSTRA, 1974).

	Ad libitum		Restricted	
	In favour of boars	In favour of hogs	In favour of boars	In favour of hogs
Growth rate		35 g	24 g	
Food conversion	0.38 kg		0.27 kg	
Classification (% IA)	40.1 %		22.9 %	
Slaughter loss		1.4 %		1.0 %
Lean meat percentage	5.5 %		4.6 %	
Fat percentage		6.3 %		5.3 %
Bellies		1.0 %		0.8 %
Slaughter offals		0.8 %		0.7 %

At the moment ELISA methods with which it is possible to screen thousands of carcasses a day are in development. An advantage in this way of improvement is that the meat quality is not affected to a large extent by this carcass quality upgrading.

### 5.2. Meat quality

Many investigations have taken place on the influence of external factors on the meat quality. This is, for instance, true for transport conditions, the conditions around the stunning and during the slaughtering (time effect). BARTON (1971) points to the fact that not all muscles react the same way to certain treatments during transport. VERDIJK (1974) and LENDFERS (1974) also studied this problem. Not only the transport loss has been decreased, but also the meat quality could be improved. This is true for PSE, DFD and blood splashes (haemorrhages) in the muscles. Although these influences are relatively important the overall effects in comparison with the effect of the adequate genetic measures are limited.

### 5.3. Fat quality

If the flavour of the fat and the consistency is due to shortcomings in the feed no doubt effective measures can be taken. These defects, however, are not wide spread. A different question is that the backfat thickness and its structure diminishes quite substantially after selection on leanness. This also affects negatively the technological quality of fat. A correction is partly possible by aiming at a higher weight. The fat layer will increase accordingly.

## 6. CONCLUDING REMARKS

The most important stimulus for the further development of the pork production is of course a continuing growth of the consumption which is closely linked with the state of the economy. Even if one takes into account a leveling off of the human population increase in Europe, and especially in the higher pig producing countries, and limiting measures due to energy and pollution problems, a future increase of the pork production may be expected. This goal may be reached apart from increasing the pork production quantitatively by different measures, such as: a steady increase of the carcass quality, a castration stop and selection on stress resistance and leanness. In order to guarantee an optimal quality level to further this development the interrelationships between the different production aspects have to be taken into account more than ever before.

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