Concentrations of fat and plasma 5 α -androstenone and plasma testosterone in boars selected for rate of body weight gain and thickness of back fat during growth, sexual maturation and after mating

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Summary. The levels of 5 α -androstenone and testosterone in peripheral plasma and 5 α -androstenone in fat collected from 18 boars selected according to thickness of back fat and rate of gain were evaluated. Sampling was started when the animals were about 100 days of age and samples were collected every 14 days until the boars were about 240 days old.

The steroid profiles varied considerably between boars, although an increase in steroid levels was found in most animals with the onset of adolescence. The regression line for the level of 5 α -androstenone in fat and the age of the animals in days was found to be $y = 0.02x - 1.31$. High coefficients of correlation were found between the concentration of 5 α -androstenone in peripheral plasma and fat ($r = 0.78$) and between levels of 5 α -androstenone and testosterone in peripheral plasma ($r = 0.64$). Levels of 5 α -androstenone in peripheral plasma above about 15 ng/ml were usually accompanied by a heavy accumulation of 5 α -androstenone in adipose tissue. The use of four of the boars for mating resulted in increased steroid levels in peripheral plasma and fat. Significantly higher levels of 5 α -androstenone and testosterone were found in the peripheral plasma of boars selected for fatness and a low rate of gain than in boars selected for low back-fat thickness and a high rate of gain.

Introduction

Besides testosterone (17 β -hydroxy-4-androsten-3-one) and androstenedione (4-androstene-3,17-dione) (Lindner, 1961), the boar testis also produces and secretes various strongly smelling 16-unsaturated C₁₉ steroids (Saat, Gower, Harrison & Heap, 1972) which have been found to possess little or no androgenic activity (for review see Gower, 1972). This latter group of steroids might serve physiologically as pheromones (Sink, 1967), and it has been shown that 16-unsaturated C₁₉ steroids can be used to facilitate the detection of oestrus in the sow (Melrose, Reed & Patterson, 1971; Meding, 1972; Reed, Melrose & Patterson, 1974).

Patterson (1968) identified one of these steroids, 5 α -androstenone (5 α -androst-16-en-3-one), in fat from the mature male pig. This lipophilic steroid has an unpleasant urine/perspiration-like smell and is believed to be largely responsible for the objectionable aroma which can be detected during the heating of fat derived from some boars. The odour is commonly referred to as boar taint or sex odour and positive coefficients of correlation in the range of 0.51 to 0.76 have been registered between the subjective judgement for boar taint and the level of 5 α -androstenone in samples of boar fat (Fuchs, 1971; Patterson & Stinson, 1971; Newell, Tucker, Stinson & Bowland, 1973; Malmfors & Andresen, 1975).

The occasional presence of boar taint is the reason why boar meat in general is considered inferior to, and is less costly than, meat from gilts and castrated males. Most male pigs are therefore castrated when a few weeks old (barrows). Boars are, however, superior in other respects, and several experi-

ments, summarized by Turton (1969), as well as the work by Hansson, Lundström & Malmfors (1975) have shown that boars have more favourable carcass characteristics and produce more lean meat and less fat than barrows. Hansson (1974) has also confirmed that boars fed according to age have a better feed conversion and a higher growth rate than barrows. Conflicting results have been reported regarding the incidence of boar taint (Bratzler, Soule, Reineke & Paul, 1954; Kroeske, 1963; Williams, Pearson & Webb, 1963; Prescott & Lamming, 1964; Teague, Plimpton, Cahill, Grifo & Kunkle, 1964; Vold, 1969; Elsley & Livingstone, 1969), but recent investigations seem to confirm that the incidence is rather low (Malmfors & Hansson, 1974; Walstra, 1974). It would therefore be desirable to find methods other than surgical castration of young males to control the occurrence of boar taint.

The present work was undertaken to obtain further information regarding the occurrence of and relationships between the anabolic testosterone and the possibly pheromonal 5 α -androst-4-en-3-one in the boar, and in genetically different groups of boars.

Materials and Methods

Animals

The animals were of the Norwegian Landrace breed and were included in a selection experiment started in 1964 at the Department of Animal Genetics and Breeding, The Agricultural University of Norway. The selection was based on an index including rate of gain and thickness of back fat (Standal, 1967). One line (HP) was selected for high rate of gain and low back-fat thickness, one line was selected in the opposite direction (LP), and the other line was maintained without deliberate selection (CG). Data on the differences between the three lines have been reported (Standal, Vold, Trygstad & Foss, 1973; Vangen, 1974a, b). By the fifth generation the difference in daily weight gain between pigs in the HP and LP lines from weaning to slaughter was found to be about 60 g (Vangen, 1974b).

The groups of animals in the present study comprised boars from the 7th and 8th generations. The difference in the average back-fat thickness at a liveweight of 90 kg between the HP and LP boars was found to be 15.4 mm (HP = 20.3 mm; CG = 20.9 mm; LP = 35.7 mm). Boars from the different lines were penned together in groups of 3 (1 HP, 1 LP, 1 CG), 5 (1 HP, 3 LP, 1 CG), and 10 (4 HP, 2 LP, 4 CG) in a room which also housed a number of gilts and barrows. Towards the end of the experimental period, 4 of the boars were used for a number of mating tests and during this period they were individually penned. The animals were fed the same diet *ad libitum* until they reached 90 kg liveweight; they then received a daily ration of 2–2.5 Scandinavian feed units, containing approximately 400 g crude protein.

Sampling

Samples of blood and adipose tissue were collected from the animals between 10.00 and 12.00 hours every 14th day from about 100 to 240 days of age.

Blood (5 ml) was drawn from an ear vein into heparinized Vacutainers (Becton-Dickinson, Grenoble, France) and plasma prepared by centrifugation. Samples of adipose tissue were taken dorsally from the neck and 5–10 cm cranial to the shoulder blade by the use of a biopsy needle as described by Lundström, Asp-Malmfors & Hansson (1973). All samples were stored at –20°C until analysed, usually within a few days.

Analytical methods and calculations

5 α -Androst-4-en-3-one in peripheral plasma and adipose tissue was estimated by radioimmunoassay utilizing antibodies raised against 5 α -androst-16-en-3-(O-carboxymethyl)oxime conjugated to bovine serum albumin (Andresen, 1974, 1975b). 5 α -Androst-4-en-3-one and [5 α -³H]androst-4-en-3-one were generously supplied by Syntex Research, Stanford Industrial Park, Palo Alto, California, U.S.A.

The mean efficiency $\pm$ S.D. of extraction of 5 α -androstenone from plasma and biopsies of adipose tissue has been found to be $82.8 \pm 4.4\%$ ($n = 171$) and $98.3 \pm 5.3\%$ ($n = 69$), respectively. The mean $\pm$ S.D. for ethylacetate-extractable fat from adipose tissue from boars in this age range has been found to be $85.9 \pm 5.6\%$ ($n = 115$). These mean values have been used as correction factors in the calculation of 5 α -androstenone in peripheral plasma and fat.

All samples were analysed in duplicate. The S.D. of the duplicate determinations was calculated according to the formula $S.D. = \sqrt{\sum d^2/2n}$ where d = difference between the results of parallel determinations of the same sample and n = number of samples. For the analyses of 5 α -androstenone in peripheral plasma and fat, standard deviations of 1.06 ng/ml and 0.28 μ g/g, corresponding to coefficients of variation of 9.9% and 12.4% respectively were found.

Testosterone was estimated by a radioimmunoassay described by Sanwal, Sundby & Edqvist (1974) as modified by Sundby, Tollman & Velle (1975). The cross-reactivity between 5 α -dihydrotestosterone (17 β -hydroxy-5 α -androstan-3-one) and testosterone in this assay is 40%, and the concentrations of testosterone reported are therefore influenced by the level of 5 α -dihydrotestosterone in the samples. The cross-reactivity between 5 α -androstenone and testosterone was found to be below 0.45%. The mean efficiency $\pm$ S.D. of extraction was $90.0 \pm 3.6\%$ ($n = 120$). The analyses of the duplicate determinations gave a S.D. = 0.42 ng/ml, which is equivalent to a coefficient of variation of 9.8%.

Results

Steroid profiles

Marked differences in the steroid profiles between animals were found as indicated in Text-fig. 1. Consistently low concentrations of steroids were found in samples collected when the animals were

Text-fig. 1. Steroid levels in individual boars in relation to age in days. Boars (c) and (e) were used for mating and the arrows denote the first copulation. $\bullet$, ng 5 α -androstenone/ml peripheral plasma; $\circ$, ng testosterone/ml peripheral plasma; $\blacktriangle$, μ g 5 α -androstenone/g fat.

around 100 days old. In some animals relatively low values were maintained throughout the period of study. In others, a more steady increase, especially in the 5 α -androstenedione levels in peripheral plasma and fat, was seen. In several animals, marked increases in the level of steroids in peripheral plasma were found starting when the animals were about 100–130 days old. After varying times the increase was often followed by a decrease.

When the results for the individual boars are combined (Table 1), a tendency to a steady increase in the level of 5 α -androstenedione in peripheral plasma and fat from about 100 to 170 days can be seen. The level of testosterone also increased from about 100 days, but decreased again when the boars were 150–160 days old. Excluding samples collected following mating, the coefficients of correlation between the age of the animals and steroid levels were 0.37 for 5 α -androstenedione in peripheral plasma ($P < 0.001$), 0.06 for testosterone in peripheral plasma (N.S.) and 0.38 for 5 α -androstenedione in fat ($P < 0.001$). The regression of the level of 5 α -androstenedione in fat and the age of the animals in days was $y = 0.02x - 1.31$ ($R^2 = 0.15$, $P < 0.001$).

Relationships between steroid levels

When all results were included, high coefficients of correlation were found between the concentration of 5 α -androstenedione in peripheral plasma and fat ($r = 0.78$; 0.80, 0.82 and 0.69 for CG, LP and HP boars, respectively), and between the level of 5 α -androstenedione and testosterone in peripheral plasma ($r = 0.64$; 0.72, 0.62 and 0.48 for CG, LP and HP boars, respectively), whilst the coefficient of correlation between level of testosterone in peripheral plasma and 5 α -androstenedione in fat was found to be 0.33 ($r = 0.46$, 0.24 and 0.22 for CG, LP and HP boars, respectively). All these correlations except the last two were significant ($P < 0.001$). The linear regression for the level of 5 α -androstenedione in fat and the level in peripheral plasma was calculated to be $y = 0.29x - 0.82$ ($R^2 = 0.61$, $P < 0.001$).

A level of 5 α -androstenedione in peripheral plasma below about 5 ng/ml usually corresponded to levels in fat below 1 μ g/g, whilst peripheral plasma levels beyond about 15 ng/ml plasma were regularly accompanied by a heavy accumulation of 5 α -androstenedione in the fatty tissue.

With very few exceptions, the level of 5 α -androstenedione exceeded the level of testosterone in peripheral plasma. The mean ratio between 5 α -androstenedione and testosterone in peripheral plasma for the total material was found to be 2.48, but the ratio varied considerably between samples collected at different times from the same animal. Marked increases in the peripheral plasma concentration of 5 α -androstenedione were in general accompanied by a less pronounced increase in the testosterone concentration, and there was a tendency to a larger mean ratio between the levels of 5 α -androstenedione and testosterone in peripheral plasma after puberty than before (Table 1).

Effect of mating

There was a marked increase in both the peripheral plasma levels and the fat levels of steroids after the boars had been taken into use for breeding (Text-fig. 1, Boars c and e).

Differences between groups of boars

There was a considerable degree of variation in the steroid levels within the animals belonging to the same group, but as shown in Table 1 the highest mean peripheral plasma levels of steroids were found in the LP group. The results of an analysis (Student's t test) of the differences in mean concentrations of steroids between different groups, excluding the samples collected after mating, showed that significantly higher peripheral plasma levels of 5 α -androstenedione ($P < 0.01$) and testosterone ($P < 0.05$) were found in the LP group than in the HP group, and the concentration of testosterone in the LP group was significantly ($P < 0.05$) higher than that in the CG boars; all the other differences were not significant.

Table 1. Mean ($\pm$ S.D.) levels of steroids in various groups of boars (excluding those after mating) in relation to age: HP = boars selected for a high rate of gain and a low back-fat thickness; LP = boars selected for a low rate of gain and a high back-fat thickness; CG = boars maintained without deliberate selection

	Age (days)											
	87-100	101-114	115-128	129-142	143-156	157-170	171-184	185-198	199-212	213-226	227-240	
HP boars (N = 6)												
5 α -Androstenone (ng/ml plasma)	4.5 $\pm$ 0.6	4.7 $\pm$ 1.3	5.5 $\pm$ 2.7	7.1 $\pm$ 4.1	7.7 $\pm$ 2.0	6.8 $\pm$ 3.5	6.9 $\pm$ 2.3	8.0 $\pm$ 2.1	8.6 $\pm$ 2.0	9.7 $\pm$ 3.9	11.3 $\pm$ 2.0	
Testosterone (ng/ml plasma)	2.5 $\pm$ 1.3	2.6 $\pm$ 0.7	4.5 $\pm$ 3.4	5.4 $\pm$ 2.5	5.5 $\pm$ 1.9	4.2 $\pm$ 1.4	3.4 $\pm$ 1.7	3.0 $\pm$ 1.4	2.7 $\pm$ 1.7	2.7 $\pm$ 1.4	4.5 $\pm$ 4.0	
5 α -Androstenone (μ g/g fat)	0.32 $\pm$ 0.16	0.30 $\pm$ 0.13	0.51 $\pm$ 0.20	1.55 $\pm$ 1.34	1.98 $\pm$ 1.03	1.71 $\pm$ 0.86	1.56 $\pm$ 0.90	1.81 $\pm$ 1.06	1.98 $\pm$ 1.09	1.92 $\pm$ 0.97	2.35 $\pm$ 1.33	
LP boars (N = 6)												
5 α -Androstenone (ng/ml plasma)	4.9 $\pm$ 2.0	7.6 $\pm$ 3.7	9.3 $\pm$ 6.2	12.6 $\pm$ 7.4	16.0 $\pm$ 5.2	18.6 $\pm$ 8.6	15.1 $\pm$ 7.1	16.1 $\pm$ 4.9	14.8 $\pm$ 4.4	13.6 $\pm$ 7.0	13.5 $\pm$ 5.1	
Testosterone (ng/ml plasma)	2.3 $\pm$ 0.6	3.3 $\pm$ 0.9	4.5 $\pm$ 0.9	5.9 $\pm$ 2.6	7.5 $\pm$ 3.6	8.9 $\pm$ 5.9	4.9 $\pm$ 1.9	5.7 $\pm$ 1.4	5.1 $\pm$ 2.0	3.7 $\pm$ 2.3	4.7 $\pm$ 1.2	
5 α -Androstenone (μ g/g fat)	0.30 $\pm$ 0.20	0.46 $\pm$ 0.47	0.64 $\pm$ 0.60	1.80 $\pm$ 1.88	2.34 $\pm$ 1.90	3.19 $\pm$ 2.35	3.59 $\pm$ 2.88	3.60 $\pm$ 3.18	2.89 $\pm$ 2.12	3.07 $\pm$ 2.59	2.99 $\pm$ 2.37	
CG boars (N = 6)												
5 α -Androstenone (ng/ml plasma)	4.2 $\pm$ 1.1	6.1 $\pm$ 1.4	6.4 $\pm$ 3.7	6.2 $\pm$ 4.7	7.9 $\pm$ 3.6	10.2 $\pm$ 7.2	8.9 $\pm$ 4.4	10.7 $\pm$ 9.7	11.3 $\pm$ 7.8	15.0 $\pm$ 8.0	10.3 $\pm$ 6.0	
Testosterone (ng/ml plasma)	1.4 $\pm$ 0.8	2.3 $\pm$ 1.6	2.3 $\pm$ 1.3	3.7 $\pm$ 1.9	5.6 $\pm$ 2.2	5.1 $\pm$ 3.2	3.8 $\pm$ 2.3	3.8 $\pm$ 2.0	3.6 $\pm$ 2.1	3.8 $\pm$ 2.5	2.2 $\pm$ 0.7	
5 α -Androstenone (μ g/g fat)	0.38 $\pm$ 0.49	0.41 $\pm$ 0.45	0.68 $\pm$ 0.78	1.09 $\pm$ 1.53	1.69 $\pm$ 1.89	2.19 $\pm$ 2.63	2.86 $\pm$ 4.48	3.02 $\pm$ 4.18	3.22 $\pm$ 3.64	4.77 $\pm$ 4.60	4.36 $\pm$ 4.51	
HP + LP + CG boars (N = 18)												
5 α -Androstenone (ng/ml plasma)	4.5 $\pm$ 1.0	5.9 $\pm$ 2.4	6.9 $\pm$ 4.3	8.6 $\pm$ 6.0	10.5 $\pm$ 5.4	11.8 $\pm$ 8.2	10.3 $\pm$ 5.9	11.9 $\pm$ 6.8	11.8 $\pm$ 5.5	12.7 $\pm$ 6.4	11.9 $\pm$ 4.5	
Testosterone (ng/ml plasma)	2.1 $\pm$ 1.1	2.7 $\pm$ 1.1	3.7 $\pm$ 2.3	5.0 $\pm$ 2.4	6.2 $\pm$ 2.7	6.0 $\pm$ 4.3	4.0 $\pm$ 2.0	4.3 $\pm$ 1.9	3.9 $\pm$ 2.1	3.4 $\pm$ 2.0	4.0 $\pm$ 2.5	
5 α -Androstenone (μ g/g fat)	0.34 $\pm$ 0.28	0.38 $\pm$ 0.34	0.61 $\pm$ 0.55	1.48 $\pm$ 1.53	2.01 $\pm$ 1.58	2.36 $\pm$ 2.07	2.67 $\pm$ 3.06	2.86 $\pm$ 2.99	2.71 $\pm$ 2.37	3.14 $\pm$ 2.92	3.14 $\pm$ 2.75	

Discussion

The levels of testosterone and 5 α -androst-16-en-3 α -ol in peripheral plasma of boars are influenced by a variety of external and internal factors and therefore steroid profiles based on samplings carried out with 14-day intervals will only be approximations. Diurnal variations in the level of 5 α -androst-16-en-3 α -ol might exist, although relatively stable levels have been detected during a 24-hr period in two boars (Andresen, 1975a). The finding of a high coefficient of correlation, i.e. 0.81, between the level of 5 α -androst-16-en-3 α -ol in two samples of peripheral plasma collected with an interval of 6 hr from each of 128 boars (Ø. Andresen & P. Jonsson, unpublished) also indicates that the diurnal variation is relatively slight. For testosterone diurnal variations might be of greater importance since a lower coefficient of correlation (0.61) was observed, indicating that diurnal variation in testosterone levels might exceed that in 5 α -androst-16-en-3 α -ol levels.

External factors can affect testicular steroidogenesis and stressful stimuli, such as the confinement of boars in metabolism crates, will lower the LH activity and the 5 α -androst-16-en-3 α -ol level in peripheral plasma (Liptrap & Raeside, 1968; Andresen, 1975a). Liptrap & Raeside (1968) also found that corticosteroids can depress plasma LH activity and thus reduce testicular steroidogenesis.

The level of 5 α -androst-16-en-3 α -ol in a single specimen of adipose tissue has been shown to serve as a reliable indicator for the general level of this steroid in the adipose tissue of the animal (Claus, 1975; Andresen & Bakke, 1975; Malmfors, Lundström, Hansson & Gahne, 1976). The levels of 5 α -androst-16-en-3 α -ol in adipose tissue are probably less influenced by rapid, short-term changes in the testicular secretion that affects the peripheral plasma levels, and the levels in adipose tissue samples should therefore be a better indication of the mean testicular secretion of the steroid than those measured in peripheral plasma. In the present experiment the coefficient of correlation found between the level of 5 α -androst-16-en-3 α -ol in samples of peripheral plasma and fat collected at the same time was 0.78, and the peripheral plasma level of 5 α -androst-16-en-3 α -ol thus seems to give a reliable indication of the level in fat. The low correlation ($r = 0.36$) found in a previous experiment (Malmfors & Andresen, 1975) may be partly explained by the small number of animals studied and partly because the blood samples were taken at slaughter.

Boars reach adolescence when they are about 110–125 days old and become sexually mature at an age of about 6–7 months. Steroid profiles in the animals do not follow any common general pattern during this period. A factor which might be of importance in this respect is the mutual interactions between pigs resulting in the establishment of a social hierarchy (Fraser, 1974). One manifestation of such a hierarchy could be a depression or a delay in the onset of the testicular steroidogenesis in subordinate animals. It is known that boar saliva contains 5 α -androst-16-en-3 α -ol and 5 α -androst-16-en-3 α -ol (see Gower, 1972) and the level of these odorous steroids in the saliva could be involved in the establishment of the hierarchy. In the present experiments the animals were penned in three groups. In one boar in each of these groups relatively high levels of 5 α -androst-16-en-3 α -ol were found to be maintained from about 120 days of age, whilst low levels were found in other boars in the group. Two of the high 5 α -androst-16-en-3 α -ol boars were the oldest in their group, while the other was one of the youngest. It is conceivable that the high levels of 5 α -androst-16-en-3 α -ol in peripheral plasma have resulted in high levels in saliva and thereby, through a pheromonal mechanism, may have affected the endocrine status of the other boars in the groups. However, no attempt was made to determine whether the high 5 α -androst-16-en-3 α -ol boars were the dominant ones and further work along these lines is necessary.

In most of the animals in the present study, a marked increase in steroid levels was observed with the onset of adolescence. Maximum levels of testosterone were observed at the time when the animals were regarded as being sexually mature or a little earlier (Table 1). The level of plasma testosterone in the spermatic vein of boars also increases during adolescence (Carlson, Stratman & Hauser, 1971; Gray, Day, Lasley & Tribble, 1971). The latter authors found the highest testosterone concentrations in animals 5–7 months old while lower levels were registered in boars 8 and 9 months of age.

With regard to the level of 5 α -androst-16-en-3 α -ol in adipose tissue in relation to age, increasing levels have been reported by Claus (1975). Claus, Hoffman & Karg (1971) have also reported an increase in peripheral plasma levels of 5 α -androst-16-en-3 α -ol and testosterone in boars from 175 to 229 days of age.

Elsaesser, König & Smidt (1972) found an increase in the concentration of androgens, and Booth (1975) reported an increase in the concentration of androgens and 16-unsaturated C₁₉ steroids in boar testis during adolescence, although the increase in testosterone and 5 α -androstenone seemed to be slight.

In a previous experiment, a regression line almost parallel to the one reported in the present experiment was registered for the level of 5 α -androstenone in adipose tissue on age of boars ranging from 431 to 890 days (Andresen & Bakke, 1975). No significant relationship was found, however, for boars aged 184–309 days. This may be accounted for by the finding of Claus (1975) that the increase in the adipose tissue level of 5 α -androstenone during adolescence is followed by a marked decrease when the boars are about 250 days old.

In three of the boars used for mating the steroid levels before mating were low. After the first copulation there was an abrupt increase in the steroid concentrations, indicating that although the boars might have the ability to produce and secrete testicular steroids these steroids are not secreted, perhaps because of a lack or inhibition of the appropriate stimulus. The increased levels of steroids following mating could also be a result of their removal from the influence of dominant animals, since the boars were individually penned during this period. However, marked increases in the peripheral plasma levels of 5 α -androstenone and testosterone appear to occur within minutes after mating (Ø. Andresen, unpublished), and mating may thus seem to be a potent stimulus for the secretion of testicular steroids in the boar as it is in some other species (Saginor & Horton, 1968; Katongole, Naftolin & Short, 1971).

As in a previous investigation (Andresen & Bakke, 1975) no significant difference in the absolute concentrations of 5 α -androstenone in fat was detected between the different groups of boars. However, significantly higher levels of 5 α -androstenone and testosterone were recorded in peripheral plasma of the LP boars than for the HP boars and the levels of testosterone in the LP boars were also found to be significantly higher than in the CG boars. These findings seem to be contrary to what is known about the anabolic effect of testicular steroids and it is therefore important to stress that the peripheral plasma levels of various testicular steroids will be influenced not only by the production rate in the testes, but also by the degree of their deposition in tissues, their transformation and their metabolism. The plasma volume, which is related to the fatness of the animals (Aulstad, 1969), will also obviously affect the peripheral plasma concentration. However, the results presented in this paper are supported by those of Gray *et al.* (1971) who have observed significantly higher levels of testosterone in spermatic vein plasma from boars with high back fat than in boars with lower back fat.

Comprehensive tests with consumer panels (Rhodes, 1971, 1972; Walstra, 1974) have revealed that consumers under normal household conditions are not very sensitive towards boar taint. However, sensitivity towards the odour of 5 α -androstenone, which probably constitutes the major component of the taint, varies markedly from person to person (Griffiths & Patterson, 1970). Due to this fact it is difficult to determine an upper acceptable level of 5 α -androstenone in boar carcasses marketed in the same way and utilized for the production of the same types of meat products as are the carcasses of gilts and castrated males. The mean level in the experiment performed by Rhodes (1971) was 0.59 μ g/g fat while the highest level was 1.76 μ g/g. Claus (1975) has reported that concentrations of 0.4 μ g/g fat can cause consumer reactions and that levels of 1 μ g/g fat are easily detectable. If the animals in the present experiment had been slaughtered at an age of 170 days (liveweight of about 90 kg), the mean level of 5 α -androstenone in the carcasses would have been 2.6 μ g/g fat; 14 out of the 18 boars would have had levels exceeding 1 μ g 5 α -androstenone/g fat and the incidence of boar taint in these carcasses would probably have been very high. Even though the boars were specially selected comparisons can possibly be drawn between boars in the HP group and ordinary Landrace boars. A discrepancy thus might exist between the relatively high levels of 5 α -androstenone and the low incidence of boar taint in boar carcasses reported by Malmfors & Hansson (1974). However, the testicular secretion of steroids might be influenced by the husbandry conditions and comparisons between groups of boars raised under different conditions might be questionable. In this regard there is a need for more information on the external factors affecting the testicular secretion of steroids and thereby also the occurrence of taint in boar meat.

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