GERMAN
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DIE EINFLÜSSE VON RASSE, ALTER UND SCHLACHTKÖRPERGEWICHT AUF DAS VORKOMMEN DES ABNORMALEN GERUCHS IM EBERFETT

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ZUSAMMENFASSUNG

Unter Verwendung eines ausgebildeten Ausschusses für die subjektive Prüfung des Schweinefettgeruchs studierten wir die Beeinflussung des Vorkommens eines abnormalen Geruchs durch die Parameter von Rasse, Alter und Schlachtkörpergewicht in bezug auf den folgenden Behandlungen ausgesetzten Eber:-

I Large White (Schlachtkörpergewicht 63,50-68,04 kg, Alter 140-150 Tage).
II Landrace (Schlachtkörpergewicht 63,50-68,04 kg, Alter 140-150 Tage).
III Landrace (Schlachtkörpergewicht 63,50-68,04 kg, Alter 180-200 Tage).
IV Landrace (Schlachtkörpergewicht 56,70-61,23 kg, unterschiedliches Alter).

Alle Behandlungen wurden mit Kastraten und weiblichen Tieren verglichen. Hinsichtlich den abnormalen Geruch (alle ungewöhnlichen Gerüche einschliesslich männliches Geschlechtsgeruchs) sowie den Geschlechtsgeruch zeigte es sich (a) kein signifikanter Unterschied zwischen Large White und Landrace Rassen (Behandlungen I und II) (b) signifikant höhere Anteile bei den jüngeren Tieren der Behandlungen I und II als bei den älteren Tieren der Behandlung III ($P < 0.001$) oder den leichtwiegenden Schweinen der Behandlung IV ($P < 0.05$) (c) kein signifikanter Unterschied zwischen den Behandlungen III und IV (d) signifikant höhere Anteile bei Ebern aller vier Behandlungen als bei kastrierten und weiblichen Schweinen ($P < 0.001$). Die vorwiegende Art abnormales Geruchs wurde auf männlichem Geschlechtsgeruch zurückgeführt, dessen Entwickelung von einer hohen Wachstumsrate bis zum Schlachtgewicht (Körpergewicht 63,50-68,04 kg) abhängig sein darf.

FRENCH
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LES EFFETS DE RACE, AGE ET POIDS DE CARCASSE SUR LA PRESENCE DE L'ODEUR ANORMALE DANS LA GRAISSE DE CARCASSE DU PORC MALE ENTIER

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RESUME

En employant un jury de juges expérimentés pour l'essai subjectif du tissu adipeux de carcasses, nous avons étudié les effets des paramètres de race, âge et poids de carcasse sur la présence d'une odeur anormale dans des porcs mâles entiers soumis aux traitements suivants:-

I Large White (poids de carcasse 63.50-68.04 kg, âge 140-150 jours)
II Landrace (poids de carcasse 63.50-68.04 kg, âge 140-150 jours)
III Landrace (poids de carcasse 63.50-68.04 kg, âge 180-200 jours)
IV Landrace (poids de carcasse 56.70-61.23 kg, âge variable)

Tous les traitements ont été comparés avec des mâles castrés et des femelles. En ce qui concerne l'odeur anormale (toutes odeurs exceptionnelles y compris l'odeur sexuelle) et l'odeur sexuelle, on a trouvé (a) aucune différence significative entre les races Large White et Landrace (traitements I et II) (b) des niveaux significativement plus élevés dans les animaux plus jeunes des traitements I et II que dans les animaux plus âgés du traitement III ($P < 0.001$) ou les porcs légers du traitement IV ($P < 0.05$) (c) aucune différence significative entre les traitements III et IV (d) des niveaux significativement plus élevés dans les mâles entiers de tous les quatre traitements que dans les mâles castrés ou les femelles ($P < 0.001$). Le type prédominant d'odeur anormale a été attribué à l'odeur sexuelle, dont le développement important peut dépendre d'un taux d'accroissement élevé jusqu'au poids définitif (poids de carcasse 63.50-68.04 kg)

THE EFFECTS OF BREED, AGE AND CARCASE WEIGHT ON THE OCCURRENCE OF ABNORMAL ODOUR IN BOAR CARCASE FAT

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SUMMARY

Using a trained odour panel for the subjective testing of carcase fat, we have studied the effects of the parameters breed, age and carcase weight on the occurrence of abnormal odour in respect of the following boar treatments:-

I Large White (carcase weight 63.50-68.04 kg, age 140-150 days).
II Landrace (carcase weight 63.50-68.04 kg, age 140-150 days).
III Landrace (carcase weight 63.50-68.04 kg, age 180-200 days).
IV Landrace (carcase weight 56.70-61.23 kg, variable age).

All treatments were compared with hogs and gilts. For both abnormal odour (all unusual odours including boar taint) and boar taint there was (a) no significant difference between Large White and Landrace breeds (treatments I and II) (b) significantly higher levels in the younger animals of treatments I and II than in either the older animals of treatment III ($P < 0.001$) or the lightweight animals of treatment IV ($P < 0.05$) (c) no significant difference between treatments III and IV (d) significantly higher levels in all boar treatments than in hogs and gilts ($P < 0.001$). The predominant type of abnormal odour was attributed to boar taint, the substantial development of which may be dependent on a high rate of growth to final bacon weight (carcase weight 63.50-68.04 kg).

THE EFFECTS OF BREED, AGE AND CARCASE WEIGHT ON THE OCCURRENCE OF ABNORMAL ODOUR IN BOAR CARCASE FAT

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INTRODUCTION

Boar taint, 5α-androst-16-ene-3-one, represents the main type of abnormal odour found in boar carcase fat (1); quantitative estimations have indicated that it occurs to the extent of 0.2-2.0 $\mu g/g$ (2), and by analogy with the standard compound this represents a substantial variation in strength of odour. Very little knowledge is currently available on those parameters which might possibly affect the level of taint developed. In a study of Danish Landrace boars Wismer-Pedersen (3) found no correlation between boar taint intensity and age (range 120 days - 6 years) by a method of testing which involved heating samples to 100°C. Further analysis of the results showed a small heritability of 0.13 ± 0.08, suggesting that additive gene action is involved in the production of boar taint. Considering weight, Elsley and Livingstone (4) found practically no taint in animals killed at 43 kg liveweight (samples heated to 110°C), whilst the recent work of Robb et al. (1) using a heated soldering iron (160 - 180°C) has indicated that all animals in the bacon weight range (carcase weight 63.50 - 72.57 kg) possess clearly recognisable levels of taint. Elsley and Livingstone (4) also found no relationship between age at slaughter weight (55, 78 and 92 kg) and strength of taint, but here the question arises as to whether or not a temperature of 110°C volatilizes sufficient taint for judges to differentiate clearly between groups of samples. Apart from age and weight, the most obvious parameters which need to be very closely examined in connection with the development of 5 - androst-16-ene-3-one are (1) breed (2) rate of growth (3) type of litter (4) onset of puberty (5) stocking density during rearing (6) diet and (7) anatomical location.

In previous work (1) we have shown that boars reared for commercial purposes contain significantly higher levels of abnormal odour (all unusual odours including boar taint) and boar taint than either hogs or gilts ($P < 0.001$). This paper describes our preliminary studies, within the

framework of commercial requirements, of the influence of breed, age and carcase weight on the occurrence of abnormal odour and boar taint in boar carcase fat.

MATERIALS AND METHODS

Odour Panel

The panel consisted of 5-9 judges, most of whom had gained experience as members of Panel A described in previous work (1).

Sample Preparation, Sample Testing and Method of Scoring

These were the same as those described in previous work (1).

Experimental Design

The experiment was carried out in a series of 24 sessions; each session consisted of the following samples distributed at random:-

Treatment Number	Type	Age (days)	Carcase Wt. (kg)	Number of samples
I	Large White boar	140-150	63.50-68.04	1
II	Landrace boar	140-150	63.50-68.04	1
III	Landrace boar	180-200	63.50-68.04	1
IV	Landrace boar	Variable	56.70-61.23	1
V	Large White x Landrace hog	Approx.180	63.50-72.57	4
VI	Large White x Landrace gilt	Approx.180	63.50-72.57	4

Treatments I and II provided a straight comparison of breeds; II and III formed an age comparison within the Landrace breed; IV as a light carcase weight comparison against the other three bacon weight treatments. Each animal in treatments I and II was penned separately and reared on a special test diet containing 18% crude protein; animals in treatments III and IV were selected from two commercial herds (8-12 animals per pen) fed on a similar diet. Hogs and gilts were selected at random from the normal factory intake.

STATISTICAL TREATMENT

The 24 sessions were analysed by calculating mean panel values and standard errors (abnormal odour and boar taint) for each treatment. Differences in means were obtained for (a) individual sessions (b) treatments.

RESULTS AND DISCUSSION

The results of the analysis of treatments for the 24 sessions involving 2064 responses on 96 boars, 96 hogs and 96 gilts are shown in Table I (abnormal odour) and Table II (boar taint); variation in scoring between sessions was not significant.

All boar treatments had significantly more abnormal odour than either hogs or gilts ($P < 0.001$). Regarding individual treatments, I and II, the fast growing animals, had significantly more abnormal odour than either III, the slow growing animals ($P < 0.001$) or IV, the lightweight animals ($P < 0.05$). The difference between treatments III and IV was not significant and neither was the effect of breed (treatments I and II). The predominant type of abnormal odour recorded for each boar treatment was due to boar taint. Table III shows the percentage of abnormal odour (not boar taint) responses in each treatment; I and II are not significantly different, but I is significantly greater than either III ($P < 0.01$) or IV ($P < 0.05$); the most common responses in each treatment were attributed to the presence of skatole and musty odours.

In the scoring of boar taint the fast growing animals (Large White and Landrace) were again significantly higher than either the slow growing Landrace type ($P < 0.001$) or the lightweight Landrace variety ($P < 0.05$) with no significant difference between the latter two. The difference in breeds was again not significant.

The most interesting feature to emerge from this experiment is the possibility that high rate of growth to final bacon weight (63.50-68.04 kg) may be associated with increased development of abnormal odour, especially boar taint. This contrasts with the findings of Elsley and Livingstone (4), which showed that boars at 92 kg liveweight did not display significant variation in boar taint level over the age range 155-288 days. However, in this work the method of odour testing involved heating fat to a temperature of 110°C, which is well below that used in the isolation of 5α-androst-16-ene-3-one (2) or indeed, from a domestic point of view, normal frying temperature. We frequently observed that panel judges found it somewhat difficult to detect taint, if the temperature of the soldering iron fell below 150°C.

The wide variation in the rate of growth of boars to commercial bacon weight (carcase weight 63.50-72.57 kg in 160-200 days) largely depends on (1) genetic factors which control food conversion (2) type of diet and (3) various conditions of management. The exact pathway by which the sex hormones are converted to 5α-androst-16-ene-3-one is still not clearly understood and therefore it would be rather difficult at present to study the detailed biochemical effects of varying growth rate on this system. We are continuing studies by observing the levels of taint developed in three large groups of boars reared at different growth rates under strict conditions of diet and management.

In view of what has been discussed above it is possible that the differences in abnormal odour and boar taint between treatments I-II and treatment IV are due to the compounding of the factors carcase weight and rate of growth.

TABLE I. Mean abnormal odour values for treatments (24 sessions).

Treatment	I	II	III	IV	V	VI
Mean	0.796	0.690	0.487	0.557	0.178	0.143

Combined standard error of treatments I-IV = 0.042.
Combined standard error of treatments V-VI = 0.021.

TABLE II. Mean boar taint values for treatments (24 sessions).

Treatment	I	II	III	IV	V	VI
Mean	0.841	0.769	0.485	0.560	0.112	0.090

Combined standard error of treatments I-IV = 0.056.
Combined standard error of treatments V-VI = 0.028.

TABLE III. Percentage of abnormal odour (not boar taint) responses for each boar treatment.

Treatment	Total number of responses per treatment	Abnormal odour (not boar taint)
I	172	24.42
II	172	18.60
III	172	11.63
IV	172	15.70

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