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Zootechnical performances of young fattening boars implanted with either estradiol or estradiol + testosterone[4]

1. Introduction

During the last decades many researchers have studied various ways to improve the pig's potential for growth. One of these ways is the use of anabolic steroids. These are more widespread in beef cattle than they are in pigs. Earlier experiments (see review de Wilde, 1981) with steroids in pigs were carried out with synthetic preparations which are orally active but these products present some health hazards to the consumer. More save are the endogenous steroids (oestradiol, progesteron, testosteron) which have to be implanted subcutaneously. Previous experiments with these endogenous steroids at our laboratory showed favourable effects on feed efficiency and carcass composition in particular in barrows (de Wilde & Lauwers, 1984).

Fattening of boars is another way to improve the pig's potential for lean growth. However, some boar carcasses develop an unpleasant cooking odour, the so-called boar taint. This boar odour can be suppressed by implanting boars with the synthetic steroid diethyl stilbestrol (DES) (Ockerman et al., 1981).

The aim of the present experiment was twice: firstly to examine how the zootechnical performances can be improved by the use of steroids (oestradiol 17 beta or oestradiol 17 beta + testosterone) in young fattening boars and secondly to prove if this hormonal treatment can decrease the incidence of boar odour. This latter topic is extensively treated by de Brabander et al., 1989.

2. Material and methods

Thirty six boars of about 23 kg were divided into 3 groups according to age and litter. Previously, all animals were halothane tested. A high protein diet was individually fed on a restricted weight scale (Table 1). At about 53 kg weight one group (0) was implanted at the ear basis with 34 mg oestradiol 17 beta (Compudose, Eli Lilly), a second group (TO) with 20 mg oestradiol + 200 mg testosterone (Synovex FTO, Upjohn). The third group (C) was left untreated. All boars were slaughtered at about

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Table 1

Composition of the ration

Composition	(g/kg)	Contents	
Barley	150		
Wheat	150		
Maize	242	NE (MJ/kg)	9,4
Cassave	100	Dig. crude protein	16,2 %
Lucerne meal	20	Total lysine	0,97 %
Soybean meal	241	Total Met + Cys	0,74 %
Herring meal	15	Virginiamycine	10 ppm
Pollards pellets	20	Copper	125 ppm
Fat supplement	29		
Vitamins + minerals	33		
	1000		

98 kg. The entire genital tract was collected for macroscopic and histological examination in the same manner as was done in a previous experiment (LAUWERS, 1984).

Five comparable boars were slaughtered at 55 kg live weight and chemically analysed as controls before the implantation period started. Growth performances were recorded and the carcass characteristics were determined by measurements and chemical analysis of the left side. Energy and protein retention during the implantation period was calculated by subtracting the content of the 55 kg control animals from the contents at 98 kg. The energy retention was calculated by multiplication of the retained fat amount by 39.4 kJ/g and of the retained protein amount by 23.2 kJ/g. Blood samples were taken before implantation and every week after implantation for determination of steroid hormones.

Table 2

Growth performances of control (C) oestradiol implanted (O) and testosteron-oestradiol implanted (TO) boars

	C		O		TO		Sign.
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	
Number of animals	11		11		12		
Initial weight (kg)	24.0	2.0	23.6	2.6	23.4	2.3	NS
Weight at implantation (kg)	53.1	4.5	52.9	4.8	52.8	3.6	NS
Slaughter weight (kg)	98.4	2.6	95.9	3.0	98.1	2.5	NS
Implantation period							
Daily feed intake (kg)	2.46	.17	2.48	.09	2.50	.06	NS
Daily weight gain (g)	907	86	924	98	928	71	NS
Feed/gain	2.73	.27	2.71	.28	2.70	.24	NS
Total exper. period							
Daily feed intake (kg)	2.09	.11	2.08	.08	2.09	.06	NS
Daily weight gain (g)	804	65	807	74	821	61	NS
Feed/gain	2.61	.22	2.59	.22	2.58	.15	NS

3. Results

The growth performances are presented in Table 2. During the implantation period as well as in the time before implantation the pigs received a daily amount of feed which was the same for the 3 groups in order to avoid differences in feed intake between groups due to treatment, which was observed in ad lib. feeding conditions in a previous experiment (DE WILDE & LAUWERS, 1984). Differences in growth rate of the treated animals were absent and this was the same for feed conversion efficiency. Since on the other hand the growth rate and feed intake before implantation needed to be the same in order to have comparable groups at implantation time, the performances over the whole fattening period did not indicate any effect of the treatment. The carcass characteristics are given in Table 3.

Table 3

Carcass characteristics of control (C), oestradiol implanted (O) and testosteron-oestradiol implanted (TO) boars

	C		O		TO		Sign.
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	
Carcass length (cm)	81	2	81	2	81	2	NS
Backfat thickness (cm)	2.39	.44	2.45	.54	2.30	.27	NS
Protein content (%)	17.3	.7	17.2	.5	17.3	.6	NS
Fat content (%)	18.3	3.4	17.7	2.5	17.2	3.4	NS

The lean control boars were not further improved neither by oestradiol alone nor by the combination with testosteron. In Table 4 the daily energy and protein retention between 53 and 95 kg are calculated. Again there were no changes in amounts of retained energy or protein between the 3 groups.

Table 4

Protein and energy retention during the implantation period of control (C) oestradiol implanted (O) and testosteron-oestradiol implanted (TO) boars

	C		O		TO		Sign.
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	
Energy retention (MJ/d)	11.17	2.15	11.00	1.90	10.69	1.86	NS
Protein retention (g/d)	156	20	155	15	160	19	NS
Energy in protein as % of energy retention	33.5	7.5	33.9	8.0	36.0	8.4	NS

4. Discussion

Not any zootechnical parameter was significantly affected by treatment. Oestradiol 17 beta does not seem to be a very strong anabolic agent in boars neither alone nor in combination with testosteron. Previous experiments demonstrated also a lack of effect in the combination oestradiol + progesteron but stated a significantly leaner carcass when boars were implanted with the combination oestradiol + trenbolone (DE WILDE & LAUWERS, 1984).

There is a trend to a smaller fat content and a somewhat higher protein retention

in the TO group. This can be misleading since the partitioning between halothane sensitive and halothane resistant pigs in the 3 groups was not exactly equal. In the C-group the proportion was 8 Hal. resistant and 3 Hal. sensitive; the proportions in the O resp. TO group were 7 and 4 resp. 7 and 5. From earlier findings on a larger number of animals (DE WILDE, 1984) and from a variance analysis on the figures of the present experiment it could be demonstrated that the Hal. sensitive animals were significantly leaner than the Hal. resistant ones so that the leaner carcasses of the TO-group can be partly explained by the relatively higher number of halothane sensitive pigs.

The lack of response may be due to the relatively unsufficient release of the hormones from the implant, compared with the amount produced by the boar himself. There was indeed no significant rise in serum oestradiol and testosteron values in the implanted animals compared to the control boars (DESCHUYTERE et al., 1987). In another trial, cited by the same authors, implanted castrates had comparable serum steroid values as control boars, and both figures were significantly different from the values of the untreated castrates, which were nearly nil.

Macroscopic and histological examination of the gonads revealed a greater influence of the TO group than of the O group on the development of the gonadal organs; hypoplasia of the testes and stimulation of the secondary genital organs (LAUWERS, 1989). These findings are consistent with the results of the androstenon (steroid, responsible for boar odour) values in backfat samples, which are lower in the treated groups, even significantly in the TO group (DE BRABANDER et al., 1989). These lowered androstenon values were parallel with a decrease of the boar odour, observed by a taste panel. These observations prove that the implantations have a greater sexual than an anabolic effect, even in the absence of any difference in serum steroid values.

In conclusion we can state that the implantation of young fattening boars at 50 kg live weight with a steroid anabolic agent (oestradiol or oestradiol + testosteron) had no favourable effect on growth rate, feed conversion efficiency, protein retention and carcass quality. This is in contrast to previous experiments with the same steroids in barrows or with oestradiol + trenbolone in boars, where favourable effects were noted especially in carcass composition.

The only indication for using the endogenous steroids in fattening boars is the greater chance of having no sexual odour in the pork meat.

Summary

In experiments with young fattening boars, implanted at 50 kg with either oestradiol 17 beta (34 mg) (O group) or oestradiol 17 beta + testosteron (20 + 200 mg) (TO group) and fed the same amount of a protein rich diet, there was not any favourable effect on growth rate, feed conversion efficiency, carcass composition and protein retention, as calculated by carcass analysis of slaughter weight pigs and 50 kg live weight pigs.

There were no differences in serum steroid concentrations between control and implanted boars, but there were differences in macroscopic and histologieal aspects of the gonads, which were significant between control and TO groups. These results were confirmed by the suppression in both treated groups of the androstenon concentration in backfat samples, steroid which is responsible for the sexual odour of the meat of boars.

Zusammenfassung

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Zootechnische Leistungen junger Masteber mit Implantaten von Östradiol oder Östradiol + Testosteron

In Versuchen mit jungen Mastebern, denen bei einer Lebendmasse von 50 kg entweder 17-β-Östradiol (34 mg) (Gruppe 0) oder 17 β Östradiol + Testosteron (20 + 200 mg) (Gruppe TO) implantiert wurden und die mit der gleichen Menge einer proteinreichen Diät gefüttert wurden, zeigte sich keine positive Auswirkung auf die Wachstumsrate, den Futteraufwand, die Schlachtkörperzusammensetzung und den Proteinansatz, wie durch Schlachtkörperanalyse von Schweinen zum Mastende (100 kg) und Schweinen mit einer Lebendmasse von 50 kg ermittelt wurde.

Es traten keine Unterschiede hinsichtlich der Steroidkonzentration im Serum zwischen den Kontrolltieren und den implantierten Ebern auf, es gab jedoch Unterschiede in makroskopischen und histologischen Aspekten der Gonaden, die zwischen den Kontroll- und TO-Gruppen signifikant waren. Die Ergebnisse wurden bestätigt durch die Verminderung der Androstenonkonzentration in Rückenfettproben in beiden behandelten Gruppen: Androstenon verursacht den Sexualgeruch des Fleisches bei Ebern.

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