CONSEQUENCES OF ANDROGEN ADMINISTRATION ON INDOL AND SKATOLE CONCENTRATION IN BAKFAT IN MALE PIGS

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SUMMARY
In the present experiment we have studied the consequences of a 300 mg of trenbolone acetate implanting in entire male pigs at 50 Kg live weight on endocrine activity and on indol and skatol concentration in backfat. The dynamic of trenbolone excretion by urine showed a very slow elimination rate, since the concentration was still very high (19.26+6.78 ppb) two months after implanting. This prolonged trenbolone being present in the blood stream of implanted animals provoked reduction of the endocrine secretion of testicles, as evidenced by the reduced serum testosterone concentration and backfat androstenone level. On the other hand, indol and skatol concentration of backfat did not decrease at all and even showed a moderate increase as a consequence of the trenbolone implanting. This was attributed to the presence of the exogenous androgen which might participate in the synthesis, transport and/or deposition of these compounds.

INTRODUCTION

Consumer preferences for leaner meat have stimulated researchers to investigate systems that optimize production advantages and result in optimal meat quality. This has led to a increased interest for using entire male pigs, based in the fact that they produce more lean and have a higher feed efficiency than castrates. However, since a urine-like odour taints the meat of some boars, its use is not recommended, and studies will be necessary in the future in order to avoid the occurrence of this problem.

Since Patterson (1968) reported the presence of androstenone, of testicular origin, in the fat of tainted boars, several attemps to interfere with the metabolism of this steroid have been tried. Among them is the administration of high doses of androgens in order to block the endogenous testicular synthesis through the feedback mechanism and so provoke similar effects to castration (Patterson et al, 1981; Lopez-Bote & Ventanas, 1988).

However, the question seems to be more complex, since some other compounds, as indol and skatol have been also demonstrated to be related to the presence of boar taint. Although their participation in the genesis of boar taint has been widely reported, the metabolism of these compounds and why their concentration in pig fat is sex-dependent have not yet been explained. Different studies in ruminants have identified pathways for skatol synthesis, transport and degradation and a

number of possible metabolites (Bradley & Carlsson, 1982), but there is little information on skatole metabolism in pigs. It seems to exist a relationship between the presence of testicle and the concentration of indol and skatole in backfat, since castration decreases the concentration of these compounds and gilts have lower concentrations than boars (Hansson et al, 1980). The aim of the present experiment was to study the consequences of long acting exogenous androgen administration in entire male pigs at 50 Kg live weight on testicular endocrine secretion in order to produce castration-like effects, and to assess how the low testicular activity together with high androgenic stimulation may influence the Indol and skatole concentration in backfat.

MATERIAL AND METHODS

The experimental material consisted of 24 entire male pigs divided in two groups: control (C) and trenbolone acetate implanted (TB). TB animals were implanted subcutaneously at the base of the ear with 300 mg of trenbolone acetate (Roussel Uclaf. France) at 50 Kg live weight. All animals were slaughtered at six months of age. Testicular weight was recorded at the time of slaughter.

Serum testosterone concentration was analysed by radioimmunoassay (Serono Kits). Indol and skatole concentrations in backfat were determined by HPLC (Garcia-Regueiro & Diaz, 1989). Backfat androstenone content was analysed by capillary gas chromatography (Garcia-Regueiro & Diaz, 1989).

The persistence of trenbolone in the living animal was assessed analyzing the concentration of this agent when eliminated by urine at different period after the implanting. This was carried out by HPLC and TLC (Reuvers & Perogordo, 1986)

RESULTS AND DISCUSSION

The dynamic of trenbolone excretion by urine showed a very slow elimination rate, since the concentration was still very high (19.25+6.78 ppb) two months after implanting (FIGURE 1). This is in contrast with some other species, and was attributed to the high develop adipose tissue in pigs, which may slow its absortion from the subcutaneous fatty tissue.

The so prolonged trenbolone being present in the blood stream provoked testicular atrophy (188.1g in control versus 70.2g in implanted) and reduced endocrine function of testicles, as evidenced by the reduced serum testosterone concentration (29.7+ 3.56 ng/ml versus 2.7+3.53) and backfat androstenone level (0.52+ 0.51 ppm versus 0.23+0.12) (FIGURE 2A). It has been also recently reported increased secretory activity of prostate in trenbolone implanted animals and physiological size of bulbourethral glands (in contrast to castrates), which are target tissues for androgens (Lopez-Bote el al, 1989). These changes were attributed to the two ways action of anabolic

androgen agents: 1) directly in the androgen receptors located all along the body, which explain the muscle and accesory glands development, and 2) indirectly by the inhibition of endocrine secretion through the feedback mechanism, which explain the testosterone and androstenone lower concentrations.

On the other hand, indol and skatole concentration of backfat did not decrease at all and even showed a moderate increase as a consequence of the trenbolone implanting (0.093+0.030 ppm in treated animals versus 0.036+0.011 ppm in control for skatol and 0.052+0.030 ppm versus 0.017+0.006 ppm for indol) (FIGURE 2B). This may be attributed to the presence of the exogenous androgen (trenbolone) which might participate in the synthesis, transport and/or deposition of these compounds. Therefore a relationship seems to exists between the circulating androgens and the indol and skatol metabolism. This hypothesis might be helpful to explain some aspects of the metabolisms of indol and skatol in pigs, as is for example the relationship between the concentration of these two compounds and androstenone in backfat (Hansson et al, 1980), since the latter is indirectly related to the testosterone secretion by the testicles.

The high concentration of indol and skatol when the endogenous endocrine function of testicles was low shows the independence of their metabolism from the testicular activity and debate the administration of androgens to male pigs to produce castration-like effects. Further research to establish whether this is due to a change in skatole production within the gut, the absortion or the tissular storage will be neccessary.

CONCLUSIONS

Androgen administration to entire male pigs provoke inhibition of testicular endocrine secretion and markedly reduce the backfat concentration of androstenone. However, indol and skatole concentration had a moderate increase as a consequence of the administration, which suggest the independence of their metabolism from the testicular activity.

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FIGURE 1.- Evolution of the concentration of trenbolone secreted by urine (ppb) from the moment of the adminstration to the salughter time.

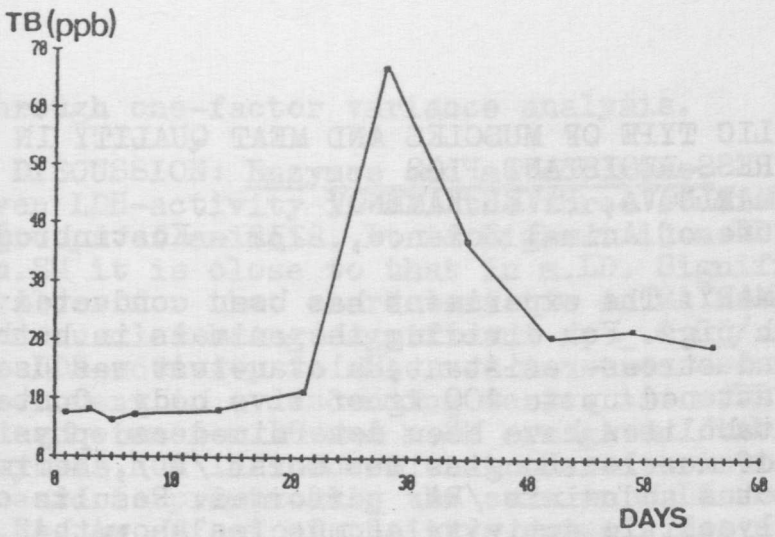

FIGURE 2.- Concentration (ppm) of (A) androstenone an (B) indol and skatole in the backfat of control and trembolone implanted male pigs.