

**EFFECTS OF BREED AND RATIONING CONCENTRATES ON LAMBS SUBCUTANEOUS ADIPOSE TISSUE QUALITY**

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**KEYWORDS** : carcass quality / lamb / fat / color / firmness**BACKGROUND**

Further to the intensification of french sheep production, with great use of pellets of complete concentrated feeds based on milled cereals offered ad libitum, some lambs have been criticized for some years for their soft and/or colored fat (PRACHE *et al.*, 90). These defects are worrying seriously the french sheep industry. They depreciate carcasses and make their marketing especially difficult because of very hard competition (AUROUSSEAU, 79).

**OBJECTIVE**

This experiment allowed to study the effects of 3 factors on lambs subcutaneous adipose tissue quality : father breed, rationing concentrates (meaning food restriction) and growth speed before weaning. The two first factors were perfectly controlled, whereas the third one was only recorded and considered in the experimental design. One objective of this study was to investigate possible differences between breeds, as suggested by regional statistical surveys (LEGRAND *et al.*, 1992). The main purpose of this experiment was to improve results of previous studies on rationing concentrates in the latter stages of fattening (CAZES *et al.*, 1990), especially under real conditions. At last, trial must bring out possible interactions between father breed, food level at the end of fattening and growth rate before weaning. It's actually important to know whereas effect of rationing concentrates depends on father breed or lamb growth speed.

**METHODS**

All factors were tested in farm, so that we obtained realistic results. The same process was repeated in 22 farms located in 2 french areas : Poitou-Charentes and Limousin. All in all, 1549 lambs were involved in this trial.

In each farm 2 ram breeds were used - Charollais - Texel. These 2 "grass breeds" are often used to produce lamb carcasses by terminal cross-breeding. Each one of the 1974 ewe were inseminated with a mixture of semens given by several rams of the same breed. Every breed was represented by about fifteen males.

Lambs fattened indoors were reared in the same way until weaning at the age of 70 days. At that time, females were divided into 2 groups according to the diet during the end of fattening : half of them remained ad libitum and half was rationed. Male lambs submit the same treatment, but 10 days later. This allocation was realised to obtain 2 similar dietary groups considering lamb sex, father breed and growth speed before weaning. The food limitation was suited to lamb sex, females being rationed at 0.65 UFV/day (70-75% of voluntary intake) and males at 0.90 UFV/day (85-90% of voluntary intake). On the other hand, lambs ad libitum were reared together whatever their sex. Food limitation only concerned concentrate and corn-silage.

At slaughterhouse, carcasses were weighed and assessed for various criteria. Conformation and fat level were estimated according to EUROPA classification, while fat color and firmness were both graded in 3 classes (1 = no problem, 2 = slight problem, 3 = serious problem).

As main quality criteria were significantly different for males and females, statistical analysis were separately conducted on each sex. Frequencies, simple correlations and variance analysis were provided from SAS procedure (SAS 1988).

**RESULTS AND DISCUSSION**

Only 56% of the 1549 winter lambs observed offered perfectly white and firm fat. Defects were rarely serious and affected more frequently males (58% of carcasses) than females (28%). Results obtained in this study suggest that fat color and fat firmness may be partly independent. These 2 criteria would then not be as closely related as we could think according to previous results obtained in experimental farms. Thus, only 27% of the defective carcasses presented both problems : colored and soft subcutaneous fat. Furthermore, problems of color were more frequent than those related with firmness : respectively 32% versus 24% of total carcasses.

The results summarised in the table show that sire breed may significantly affect the color of subcutaneous fat of male lambs. When compared to Charollais breed, Texel breed tended to have less color defects.

Otherwise, subcutaneous fat from lambs receiving the lowest level of concentrates was less colored. This result agrees with those obtained by CAZES *et al.* (1990). Fat firmness was also improved, but only for males. It could be noted that effect of rationing concentrates on fat quality appeared not to be related to growth speed reduction (0 to 100g/day lost, depending on farm).

However, effects of father breed and of rationing varied according to the farm. Even if Texel breed and rationing concentrates are of particular interest at the level of many farms taken as a whole (like an organization of producers), in some individual farms this interest can be not observed. Unknown factors may probably interfere with those studied, which could explain this disparity of results. Moreover, fat quality defects were less commonly noticed when growth rate before weaning was high : over 260g/day for males and 240/day for females. Beneficent effect of ewe milk could perhaps be related to this observation (MOLENAT *et al.*, 1973). Finally, in most cases, there was no interaction between father breed, diet at the end of fattening and speed growth before weaning. In this experiment and with these breeds, effect of rationing concentrates on lambs fat quality was independent of father breed and growth speed before weaning.

## CONCLUSIONS

This study improves our knowledges about color and firmness lambs problems. It may be one of the first to suggest that breed differences may occur with regard to fat quality, especially fat color. Furthermore, effect of rationing concentrates at the latter stages of fattening has been quantified from a lot of lambs reared in several farms. Then, these data allowed to evaluate economic interests of using Texel sires and of rationing.

## PERTINENT LITERATURE

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## MAIN OBSERVED EFFECTS ON LAMBS SUBCUTANEOUS FAT QUALITY

|              |         | Effect of father breed   |   |                   |   |
|--------------|---------|--|---|-------------------|---|
|              |         | Charollais father  |   | Texel father      |   |
|              |         | Nb carcasses   | % carcasses without problem (score = 1) | Nb carcasses      | % carcasses without problem (score = 1) |
| Fat color    | Males   | 474  | 49.2% a                                 | 348               | 66.4% b                                 |
|              | Females | 393  | 78.4% a                                 | 334               | 84.7% a                                 |
| Fat firmness | Males   | 474  | 64.8% a                                 | 348               | 68.7% a                                 |
|              | Females | 393  | 86.5% a                                 | 334               | 87.4% a                                 |
|              |         | Effect of the diet level at the end of fattening                 |   |                   |   |
|              |         | Ad libitum   |   | Rationed          |   |
|              |         | Nb carcasses   | % carcasses without problem (score = 1) | Nb carcasses      | % carcasses without problem (score = 1) |
| Fat color    | Males   | 411  | 47.9% a                                 | 411               | 65.0% b                                 |
|              | Females | 370  | 79.2% a                                 | 357               | 83.5% b                                 |
| Fat firmness | Males   | 411  | 64.7% a                                 | 411               | 68.1% a                                 |
|              | Females | 370  | 90.0% a                                 | 357               | 83.8% b*                                |
|              |         | Relationship between growth speed before weaning and fat quality |   |                   |   |
|              |         | Low growth speed   |   | Fast growth speed |   |
|              |         | Nb carcasses   | % carcasses without problem (score = 1) | Nb carcasses      | % carcasses without problem (score = 1) |
| Fat color    | Males   | 413  | 49.6% a                                 | 409               | 63.3% b                                 |
|              | Females | 363  | 74.2% a                                 | 364               | 88.5% b                                 |
| fat firmness | Males   | 413  | 59.8% a                                 | 409               | 73.1% a                                 |
|              | Females | 363  | 83.2% a                                 | 364               | 90.7% b                                 |

Variance analysis were made from ratio (log) of percentages of carcasses without problem according to each modality of tested factor.

a, b : different values on the same line indicate significant differences between frequencies ( $p < 0.05$ )

\* : significant differences ( $p < 0.066$ )