COMPARISON OF THE FIRST FOUR GENERATIONS OF CROSSBRED BERRICHON DU CHER x ROMANOV EWES

PERFORMANCES DES BREBIS CROISEES DES QUATRE PREMIERES GENERATIONS ISSUES DES RACES PARENTALES BERRICHON DU CHER ET ROMANOV

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INRA started already in 1969 a crossbreeding programme for creating a crossbred line with the two parental breeds Berrichon du Cher and Romanov whose abilities (reproduction and meat) are complementary (RICORDEAU et al, 1976, 1977; TCHAMITCHIAN et al, 1977). The purpose of this study was to compare growth, reproductive and milk yield performance in F1 to F4 ewes after elimination of non genetic factors of variation.

I. ANIMALS. REPRODUCTIVE RHYTHM. STATISTICAL ANALYSIS.

The experiment was carried out at the "Domaine de la Sapinière" (INRA) near Bourges (Cher). We used 1298 F1 to F4 ewes (issued from 146 sires) born from 1973 to 1977 and controlled until the age of 3 or 4 years. Male or female breeding animals used in each generation were not selected systematically. The ewes were subjected to an accelerated lambing rhythm: birth in December-January; 1st mating at 15 months in April; 2nd post-partum mating in October; 3rd and following matings in July. The traits considered were the growth of ewe-lambs from birth to 90 days; fertility, prolificacy (litter size and number of lambs born alive), weight at lambing and milk production during the first month of lactation (according to the sum of weight gains from 0 to 30 days of suckled lambs), during the first three lambings. The data were analysed by analysis of variance with fixed effects taking into account the age of the ewe-dams, year of birth, birth-rearing class and generation order of the ewes. The genetic parameters were estimated separately in F2 and F3 ewes.

II. RESULTS (table 1).

The birth-rearing class of the ewe had significant effect on weight of ewes until 4 years of age, as well as prolificacy but only at the 1st lambing.

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### TABLE 1: AVERAGE WEIGHTS AND REPRODUCTIVE TRAITS, EFFECTS OF BIRTH-REARING CLASS OF THE EWES AND DIFFERENCES BETWEEN GENERATIONS ACCORDING TO THE LEAST-SQUARES ANALYSIS OF VARIANCE

<table>
<thead>
<tr>
<th>TRAITS</th>
<th>L.S MEANS</th>
<th>EFFECT OF BIRTH-REARING CLASS OF EWES</th>
<th>DIFFERENCES BETWEEN GENERATION F1 TO F4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LIVE WEIGHT AT 30 AND 90 DAYS (Kg)</strong></td>
<td>9.6 24.8</td>
<td>** * * **</td>
<td>* * * *</td>
</tr>
<tr>
<td><strong>ADG OF WEIGHT 30-70 DAYS (g)</strong></td>
<td>253</td>
<td>** * * **</td>
<td>NS</td>
</tr>
<tr>
<td><strong>FERTILITY AND LITTER SIZE</strong></td>
<td>1st mating 0.86 - 1.67</td>
<td>* *</td>
<td>NS NS</td>
</tr>
<tr>
<td></td>
<td>2nd mating 0.82 - 1.87</td>
<td>NS NS NS NS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3rd mating 0.97 - 2.00</td>
<td>NS NS NS NS</td>
<td></td>
</tr>
<tr>
<td><strong>LAMBING WEIGHT AND MILK YIELD (kg)</strong></td>
<td>1st lambing 54.4 - 1.53</td>
<td>* *</td>
<td>NS NS NS NS</td>
</tr>
<tr>
<td></td>
<td>2nd lambing 57.0 - 1.67</td>
<td>* *</td>
<td>NS NS NS NS</td>
</tr>
<tr>
<td></td>
<td>3rd lambing 62.8 - 1.95</td>
<td>*</td>
<td>NS NS NS NS</td>
</tr>
</tbody>
</table>

ADG = AVERAGE DAILY GAIN  
L.S MEANS = LEAST-SQUARES MEANS  
** = P < 0.01  
* = P < 0.05  
NUMBER OF EWES: 1298 FOR WEIGHT UNTIL 90 DAYS; 1193, 1022 AND 820 at 1st, 2nd and 3rd lambing.

### BIRTH-REARING CLASS OF EWES (BORN, SUCKLED)

<table>
<thead>
<tr>
<th>BIRTH-REARING CLASS OF EWES</th>
<th>90 DAYS</th>
<th>No : LAMBING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1,1</td>
<td>28.6</td>
<td>55.4</td>
</tr>
<tr>
<td>2,2</td>
<td>24.5</td>
<td>54.7</td>
</tr>
<tr>
<td></td>
<td>WEIGHT (Kg)</td>
<td>LAMBING - WEIGHT (Kg)</td>
</tr>
</tbody>
</table>

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The differences between F1 to F4 ewes were never significant as regards growth from 30 to 70 days, weight at lambing, fertility, total number of lambs born and born alive per lambing, milk production. The performances of F2 to F4 ewes were comparable to the parental average calculated in contemporaneous 3 and 4 years-old ewes.

The highest heritabilities (0.11, 0.43 in F2 and F3) were found for weights at 70 and 90 days and for growth 30-70 days. The heritability of prolificacy at 1st lambing was 0.09 and 0.24 in F2 and F3 ewes; there was a genetic correlation between that criterion and the weights at 70 and 90 days, as well as the growth 30-70 days ($r_g = 0.15$ to 0.41).

III. DISCUSSION

The absence of significant differences between the performances of F1 - F4 ewes subjected to an accelerated rhythm of reproduction, confirms the first observations made in F1 and F2 ewes subjected to an annual rhythm (RICORDEAU et al, 1976b). This result is original because in all crossbreeding experiments made with the prolific Finnish or Border Leicester breeds, a "regression" of fertility and prolificacy was observed from F1 to F2 or F3. The original aspect of the INRA experiment is the utilization of Romanov as parental breed and the application of a crossbreeding programme with animals of the same generation and use of a rather large number of rams, without selection until F4.

This experiment shows that it is possible to create a synthetic line, provided that a maximum of genetic variability is used and that undesirable but more productive phenotypes are not discarded too early, like in the case of coloured animals. (RICORDEAU et al, 1982).

A selection programme is applied from the 4th generation. Furthermore since 2 years, the first selected rams have been tested in farms in various regions of France, to determine their ability of adaptation to different environmental condition.

SUMMARY

Growth performance and maternal ability of 1298 F1, F2, F3 and F4 ewes born from 1973 to 1977 and subjected to an original reproduction system were compared: 1st mating in May at 15 months; 2nd post-partum mating in October at 20 months and the following matings in July. Litter size at 1st to 3rd lambing was 1.67, 1.87 and 2.00 respectively. Least squares analysis did not show any difference between generations for fertility, litter size (total born and alive), milk production and ewe-weight at lambing. The birth-rearing class of the ewes had a significant effect on their own weight at lambing until the age of 4 years and on their prolificacy at first lambing. The 30-70 days growth rate of the ewe-lambs was the criterion which had the highest genetic correlation with litter size at first lambing (0.36 and 0.41). These results confirm previous observations on F1 and F2 ewes mated once a year. They show that there is no regression of performances in our conditions (Romanov breed, no selection until F4) and that it is possible to create a synthetic breed.
RESUME

Cette étude compare les performances de croissance et les aptitudes maternelles de 1298 brebis F1, F2, F3 et F4, nées de 1973 à 1977, et conduites suivant un système original de reproduction : 1ère lutte en mai à 15 mois, 2ème lutte post-partum en octobre à 20 mois et luttes suivantes en juillet. La prolificité aux mises-bas 1 à 3 est de 1.67 - 1.87 et 2.00.

L'analyse des moindres carrés ne fait apparaître aucune différence significative entre générations, en ce qui concerne la fertilité, le nombre d'agneaux nés (totaux et vivants) par portée, la production laitière et le poids à la mise bas. Le type de naissance-allaitement des brebis a une influence significative sur leur propre poids à la mise bas jusqu'à 4 ans et sur leur prolificité à la 1ère mise-bas. La croissance 30-70 jours des agnelles est le critère qui a la corrélation génétique la plus élevée avec la prolificité initiale (0.36 et 0.41). Tous ces résultats confirment les observations antérieures obtenues sur brebis F1 et F2 conduites avec un seul agnelage annuel ; ils démontrent l'absence de "régression" des performances dans nos conditions (race parentale Romanov, pas de sélection jusqu'à la F4) et la possibilité de créer une souche synthétique.

REFERENCES