REPRODUCTIVE PERFORMANCE OF D’MAN, SARDI AND THEIR CROSSBRED EWES JOINED TO RAMS OF TERMINAL SIRE BREEDS

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SUMMARY
Reproductive performance of 130 ewes, including fertility, ovulation rate, litter size, embryo survival, lamb viability, reproductive rate, mean lamb weight at weaning and ewe productivity, were analysed. Ewes were of Sardi, Sardi backcross, F1, F2, D’man backcross and D’man breed groups, all mated to Ile de France and Merinos Précoces rams. Breed group of ewe had a significant effect (P<0.001) only on ovulation rate, litter size and reproductive rate. In general, D’man ewes had the highest performance and Sardi ewes had the lowest one. Breed of ram had no significant effect (P>0.05) on any trait studied. It was concluded that it is preferable to use a 2 way-cross including ewes with 25% or 75% of D’man genes.

INTRODUCTION
D’man breed has been used in crossbreeding programmes in Morocco. The result is an improvement of the number of lambs born and weaned from crossbred ewes (Boujenane, 1989; Lahlou-Kassi et al., 1989), but a decrease in growth performance of their lambs (Berger et al., 1989). One way to overcome the low growth performance is the use of terminal sires. The present study was designed to assess the performance of D’man, Sardi and their crossbred ewes when joined to Ile de France and Merinos Précoces rams.

MATERIAL AND METHODS
Animals and management. The experiment, carried out at Tadla Farm of Hassan II Agronomy and Veterinary Institute, included 130 ewes of Sardi (S), Sardi backcross (SBC), F1, F2, D’man backcross (DBC) and D’man (D) breed groups. Ewes, produced from a diallel cross involving Sardi, D’man and DxB parents, were from 3 to 40 months old at mating. Ewes of each breed group were allocated at random to one of six groups, and single-sire joined to one of four Ile de France (IF) or one of two Merinos Précoces (MP) rams for a period of 40 days, starting from July 1, 1988. During the mating period, rams were introduced from 5 p.m. to 8 a.m. of the next day. Mating marks were recorded once a day.
During the mating period and two weeks before lambing

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through weaning, which occurred when lambs were 60 days of age, ewes were in confinement where they received about 1.5 kg of alfalfa hay, 0.5 kg of barley and 0.3 kg of sugar beet pulp per ewe per day. When lambs were one month old, they received alfalfa hay ad libitum and 0.2 kg of Concentrate.

Ewes were examined by laparoscopy 3 to 10 days after each service. Lambs were weighed at birth and each two weeks thereafter.

Traits studied. Fertility was defined as the number of ewes pregnant of ewes joined. Ovulation rate was defined as the number of corpora lutea present on both ovaries at a service of conception. Embryo survival was determined by the number of lambs born per corpora lutea on the two ovaries recorded at a service of conception. Prolificacy was determined by the number of lambs born (alive or dead). Lamb viability was calculated as the number of lambs weaned per the number of lambs born alive. Reproductive rate was defined as the number of lambs weaned per ewe joined. Mean lamb weight at weaning was defined as the mean weight of lambs at 60d of each ewe. Ewe productivity was determined by summing weights at 60d of all lambs per ewe joined.

Statistical analysis. Data were analysed by using least squares analysis of variance for unequal subclass numbers (Harvey, 1977). The model included the fixed effects of breed group of ewe (Sardi, SBC, F1, F2, DBC and D'man), breed of ram (Ile de France and Merinos Précoce) and their interaction. For embryo survival, the model included also the effects of number of corpora lutea (1, 2, 3 and 4 or greater) and type of ovulation (unilateral or bilateral). Linear contrasts were used to compare classes when the effect was found to be significant (P<.05).

RESULTS

Least squares means for the traits studied by breed group of ewe and breed of ram are presented in Table 1. Except ovulation rate, litter size at birth and at weaning for which breed group of ewe had a significant effect (P<.001), the other traits were not influenced by the variables studied (P>.05). In general, the lowest ovulation rate and litter size at birth were recorded in Sardi ewes, the highest were realized by D'man ewes, and the other breed groups were intermediate, with a tendency for an increase as the percentage of D'man genes increased in the genotype. This is consistent with the ranking of these breed groups at earlier ages (Boujenane, 1989). The lowest fertility was recorded in F1 ewes and the highest in D'man ewes. Embryo survival was similar for all breed groups of ewes and varied from 89% in F1 to 95% in D'man. Reproductive rate varied from 0.90 in Sardi and F1 ewes to 2.07 in D'man ewes. The low performance of Sardi is due to its low litter size at birth, whereas for F1 ewes the cause was their low fertility. Although mean lamb weight at weaning was lower for Sardi than for D'man lambs, litter weight at weaning was higher in D'man and D'man backcross than in Sardi ewes. This result indicates that ewe lamb production depends
Table 1. Least squares means (± SE) for productivity traits by breed group of ewe and breed of ram

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>Number of ewes at mating</th>
<th>Fertility</th>
<th>Ovulation rate</th>
<th>Litter size</th>
<th>Embryo survival</th>
<th>Lamb viability</th>
<th>Reproductive rate</th>
<th>Mean lamb weight at 60d</th>
<th>Ewe productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>µ</td>
<td>130</td>
<td>.86±.03</td>
<td>1.97±.09</td>
<td>1.82±.08</td>
<td>.92±.02</td>
<td>.84±.03</td>
<td>1.35±.07</td>
<td>14.5±0.83</td>
<td>17.7±0.98</td>
</tr>
<tr>
<td>Breed group of ewe</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sardi</td>
<td>23</td>
<td>.90±.08</td>
<td>1.02±.21b</td>
<td>1.00±.19b</td>
<td>.92±.04</td>
<td>1.00±.08</td>
<td>0.90±.17b</td>
<td>16.0±1.97</td>
<td>14.4±2.37</td>
</tr>
<tr>
<td>SBC</td>
<td>22</td>
<td>.86±.08</td>
<td>1.66±.21c</td>
<td>1.61±.18c</td>
<td>.93±.03</td>
<td>.89±.08</td>
<td>1.29±.17bc</td>
<td>15.7±1.93</td>
<td>19.4±2.32</td>
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<td>F1</td>
<td>23</td>
<td>.67±.08</td>
<td>1.75±.24c</td>
<td>1.60±.21c</td>
<td>.89±.04</td>
<td>.75±.09</td>
<td>0.91±.17b</td>
<td>16.2±2.27</td>
<td>13.9±2.37</td>
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<td>F2</td>
<td>21</td>
<td>.86±.08</td>
<td>1.91±.22c</td>
<td>1.79±.19c</td>
<td>.91±.03</td>
<td>.90±.09</td>
<td>1.25±.17bc</td>
<td>14.2±2.01</td>
<td>16.8±2.42</td>
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<tr>
<td>DBC</td>
<td>21</td>
<td>.89±.08</td>
<td>2.79±.22d</td>
<td>2.40±.19d</td>
<td>.92±.03</td>
<td>.67±.09</td>
<td>1.68±.17cd</td>
<td>14.3±2.04</td>
<td>20.5±2.42</td>
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<tr>
<td>D'man</td>
<td>20</td>
<td>1.00±.08</td>
<td>2.70±.21d</td>
<td>2.51±.18d</td>
<td>.95±.03</td>
<td>.81±.08</td>
<td>2.07±.18d</td>
<td>10.6±1.91</td>
<td>21.0±2.45</td>
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<td>Breed of ram</td>
<td></td>
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<td></td>
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<tr>
<td>IF</td>
<td>87</td>
<td>.82±.04</td>
<td>1.96±.11</td>
<td>1.79±.09</td>
<td>.92±.02</td>
<td>.87±.04</td>
<td>1.33±.08</td>
<td>15.1±1.00</td>
<td>17.6±1.12</td>
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<td>MP</td>
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<td>.90±.05</td>
<td>1.98±.14</td>
<td>1.84±.12</td>
<td>.92±.02</td>
<td>.80±.06</td>
<td>1.37±.11</td>
<td>13.9±1.32</td>
<td>17.7±1.60</td>
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</table>

*Means Within a column that do not have a common superscript differ (P< .05)

*** P < .001.
more on the litter size at weaning than on the weight of lambs. Breed of ram had no significant effect (P>.05) on any trait studied. Litter weights at weaning of ewes joined to Ile de France or Merinos Précocé rams were similar, although the advantage in reproductive rate was for ewes mated to Merinos Précocé, and for those joined to Ile de France rams in mean lamb weight at weaning. Interaction between breed group of ewe and breed of ram was not significant (P>.05).

DISCUSSION

The results found in this study are in general agreement with those reported in the literature with regard to the benefit of using prolific breeds in crossbreeding systems (Dickerson, 1977; Ricordeau et al., 1978; Bradford et al., 1989). They also confirm the results reported by Boujenane (1989) on the same breed groups of ewes when joined to F1 rams, for all traits except fertility which was high in F1 ewes. There was no effect of breed group of ewe or breed of ram on embryo survival. This result is similar to those reported by Bradford (1972) and Hanrahan (1982). The non-significant effect of ram breed on ewe productivity indicates that it does not make any difference which the breed of ram to join to these breed groups of ewes.

The comparison between ewe productivity of all breed groups studied shows that Sardi had the lowest reproductive rate and D'man had the lowest mean lamb weaning weight. The two backcross groups had a combination of reproduction and growth that led to high ewe productivity. The two-way cross including crossbed ewes with 25% or 75% of D'man genes may be better than the use of purebred ewes.

REFERENCES

Harvey, R.W. 1977. User’s Guide for LSML76. The Ohio State Univ., Columbus, Ohio (Mimeo.).