# A COMPARISON OF THE REPRODUCTIVE PERFORMANCE OF JAVANESE THIN-TAIL AND BORDER LEICESTER X MERINO EWES IN INDONESIA

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## SUMMARY

Lamb production was measured over an 18 month period from 30 Javanese thin-tail (JTT) and 30 Border Leicester x Merino (BLM) ewes run continually with rams of several breeds. The study was carried out in West Java, Indonesia. One hundred and forty-eight lambs were born to JTT and BLM ewes respectively, the difference being associated with both a larger number of lambings and a higher incidence of multiple births from JTT ewes. Lamb mortality did not vary significantly between breeds. Mean growth rates from birth to weaning were 162 and 216 g/day for lambs from JTT and BLM ewes respectively, but the total live weight of lamb weaned was 58% higher from JTT than from BLM ewes because of their superior reproductive performance.

## INTRODUCTION

Intensively managed Javanese thin-tail (JTT) sheep show early reproductive maturity, high fecundity and high breeding frequency (Obst *et al.* 1980). In order to relate the productivity of JTT sheep to that of sheep breeds from temperate regions, and as part of a programme to assess the potential contribution of introduced breeds to sheep production in Indonesia, the present investigation was designed to compare in the same environment the reproductive performance of JTT and first cross Border Leicester x Merino (BLM) ewes.

## MATERIALS AND METHODS

The investigation was carried out at Ciawi, West Java, Indonesia. The environment, type of animal housing and general management procedures have been described by Obst *et al.* (1980).

Thirty BLM ewes air-freighted from southern Australia arrived at Ciawi in May 1979. At the same time 30 JTT ewes at approximately the same stage of development (2 permanent incissor teeth) were purchased from local markets. Six Wiltshire Horn, 6 Suffolk and 6 Poll Dorset rams imported from southern Australia and 6 JTT rams purchased locally *were* available for use. All animals were vaccinated against anthrax, foot and mouth disease, haemorrhagic septacaemia and clostridial organisms, and given a broad spectrum anthelmintic.

Beginning in June 1979, one Suffolk, one Wiltshire Horn and one Poll Dorset ram were put separately with each of three mating groups of 10 JTT ewes, and one Suffolk, one Wiltshire Horn and one JTT ram were put separately with each of three mating groups of 10 BLM ewes. Rams were changed with other rams of the same breed every 6 weeks. Ewes remained with rams continuously except for 2 weeks *post partum* when dams and their offspring were held in separate pens. All rams were removed at the end of November 1980.

Animals had unrestricted access to water and were fed *ad lib* a pelleted ration containing about 9.5 MJ metabolizable energy/kg and 16% crude protein. Records were taken of the sire and dam of each lamb born together with its sex, type of birth and birth weight. Lambs were weaned individually at 13 weeks of age. Statistical methods for analyses were taken from Steel and Torrie (1960).

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## RESULTS

Over the whole period, 100 and 48 lambs were born and 71 and 33 lambs were weaned from JTT and BLM ewes respectively. Ewe mortality, principally from pneumonia and pregnancy toxaemia in JTT ewes, and from enterotoxaemia and pregnancy toxaemia in BLM ewes, was a serious problem (Table 1). Because the distribution of ewe mortalities varied between breeds, lamb production has been compared on the basis of the numbers of ewes alive at each lambing period.

Despite continuous mating, there were three discrete periods of lambing for both ewe breeds in November-December 1979, May-August 1980, and December 1980 - April 1981. This lambing pattern was partly a consequence of sequential pregnancies established by the first mating rather than a reflection of inherent seasonal variation in breeding activity. For example, 27 of 30 BLM and 26 of 27 JTT ewes alive at the end of the first interlambing period (January to April 1980) were precluded from lambing during that period because they had already lambed 5 months or less previously. However, of the ewes alive at the end of the second interlambing period (September to November 1980), only 7 of 26 BLM compared with 11 of 15 JTT ewes ($\chi^2 = 6.5$, df = 1, $P < 0.05$) were precluded from lambing during that second period for the same reason. It would appear that the second interlambing period was partly an expression of prolonged *post-partum* anoestrus and/or general decline in breeding activity during April, May and June 1980, particularly in BLM ewes.

TABLE 1 Lambing performance of JTT and BLM ewes

| | Means | | | $\chi^2$ | | |
|---|---|---|---|---|---|---|
| | First lambing | Second lambing | Third lambing | Between breeds | Within BLM | Within JTT |
| No. ewes alive | | | | | | |
| BLM | 30 | 27 | 13 | | | |
| JTT | 30 | 22 | 9 | | | |
| Lambs weaned/ewe alive at lambing | | | | | | |
| BLM | 0.77 | 0.19 | 0.38 | | | |
| JTT | 1.53 | 0.77 | 0.89 | | | |
| % ewes lambing of ewes alive at lambing | | | | | | |
| BLM | 90 | 27 | 46 | 11.0*** | 24.6*** | 6.2* |
| JTT | 97 | 73 | 78 | | | |
| % multiple births | | | | | | |
| BLM | 4 | 29 | 67 | 22.3*** | 14.2*** | 0.9 NS |
| JTT | 66 | 68 | 86 | | | |
| % lamb mortality (birth-weaning) | | | | | | |
| BLM | 18 | 44 | 54 | 0.1 NS | 5.9* | 11.5*** |
| JTT | 15 | 45 | 47 | | | |

* $P < 0.05$, *** $P < 0.001$, NS = not significant

The mean numbers of lambs weaned per ewe alive at each lambing and their main determinants (ewes lambing, multiple births and lamb mortality) are summarized in Table 1. More lambs were weaned from JTT than from BLM ewes because of both a higher proportion of ewes lambing and a higher proportion of multiple births. The proportion of ewes lambing was higher at the first than at subsequent lambing periods, particularly in BLM ewes. The incidence of multiple births increased with each successive lambing period and this, too, was more pronounced in BLM than in JTT ewes. There was no significant difference in lamb

mortality between breeds. An increase in lamb mortality after the first lambing was associated with an increased incidence of multiple births in BLM ewes, and an increase in *peri-partum* ewe mortality at the second and third lambings in both breeds.

Mean birth weights, growth rates from birth to weaning at 13 weeks, and live weights at weaning are summarized in Table 2. These means were possibly distorted by variation in ewe parity, sire breed, lamb sex and lamb birth type, and the total number of lambs weaned was too small to allow meaningful analysis when all potential sources of variation were dissected out. Birth type alone accounted for 68%, 43% and 48% of the gross differences between ewe breeds in birth weight, growth rate and weaning weight respectively. The best available estimates of the effect of ewe breed *per* se on lamb growth, allowing for variation in birth type, were weighted mean differences of 0.35 kg in birth weight, 31 g/day in growth rate and 3.2 kg in weaning weight, all significantly favouring BLM ewes. Despite these differences, the total live weight of lamb weaned during the investigation was only 768.7 kg from BLM ewes, compared with 1217.0 kg from JTT ewes.

TABLE 2 Growth of lambs from JTT and BLM ewes

| | No. of lambs | Mean birth wt (kg) | Mean growth rate(g/day) | Mean weaning wt (kg) |
|---|---|---|---|---|
| A. All lambs | | | | |
| BLM | 33 | 3.5 | 216 | 23.3 |
| JTT | 71 | 2.4 | 162 | 17.1 |
| B. Single-born lambs | | | | |
| BLM | 24 | 3.9 | 231 | 24.9 |
| JTT | 15 | 3.4 | 197 | 21.5 |
| C. Multiple-born lambs | | | | |
| BLM | 9 | 2.4 | 179 | 19.0 |
| JTT | 56 | 2.2 | 151 | 16.0 |
| D. "F" values + | | | | |
| Breed | | 5.8* | 27.0*** | 9.5** |
| Birth type | | 87.2*** | 69.6*** | 31.7*** |
| Interaction | | 0.3NS | 0.2NS | 0.1NS |

+ From analyses by the method of fitting constant as a 2 (breeds ) x 2 (birth types) factoral design, with 1 and 100 degrees of freedom.
* P < 0.05, ** P < 0.01, *** P < 0.001, *NS* = not significant

## DISCUSSION

Under the conditions of this investigation the lamb production of JTT ewes was clearly superior to that of BLM ewes, both in the total number of lambings and in the incidence of multiple births.

The average fertility (defined for a continuous mating system as the percentage of ewes lambing per 8-month period) of 85% recorded for JTT ewes, while lower than the 98% previously recorded (Obst *et al* 1980), was still relatively high. The average fertility of 57% recorded for BLM ewes was lower than that of JTT ewes, but was also lower than a mean of 78% recorded for the first three lambings of maiden BLM ewes mated at 8-monthly intervals in southern Australia (Fletcher, unpublished). It is probable that the poor fertility of BLM ewes was at least in part associated with their transfer from a temperate

to a tropical environment. Their prolonged *post-partum* anoestrus and/or general decline in breeding activity after the first lambing is consistent with other observations of the reproductive performance of seasonally polyoestrous temperate sheep breeds in tropical regions (Yeates *et al* 1975), and with experimental evidence that such breeds of sheep show spasmodic and depressed breeding activity after prolonged explosure to equatorial daylength (Thwaites 1965, Wodzicka- Tomaszweska *et al* 1967).

The difference between breeds in the incidence of multiple births tended to decrease with successive lambings, and this probably reflected a breed difference in the development of sexual maturity. It has been recorded, for example, that the average age at first lambing in JTT ewes is about 12 months (Obst *et al* 1980), whereas BLM ewes show poor fertility and fecundity when mated to lamb at 12-15 months of age (Tyrell *et al* 1974). The difference in fecundity between BLM and JTT ewes at maturity is therefore probably less than the present investigation suggests.

Ewe mortality tended to be higher, and lamb mortality similar or lower than previously recorded with JTT ewes (Obst *et al* 1980). The fact that BLM ewes showed equally high ewe and lamb mortality in the present investigation suggests that these are general problems of management rather than particular traits of JTT ewes. In particular, the possibility that mortality from pregnancy toxaemia in JTT ewes can be reduced without significant reduction in reproductive performance through controlled strategic supplementary feeding in place of continuous ad *lib* feeding needs to be investigated.

The inferior reproductive performance of BLM compared with JTT ewes illustrates the potential problems of attempting to increase productivity by introducing temperate sheep breeds into tropical areas, particularly in relation to the relative contributions of reproductive rate and growth rate to total meat production. In the present investigation, lambs from JTT ewes had significantly lower birth weights, growth rates and weaning weights, yet the total live weight of lamb weaned was 58% higher from JTT than from BLM ewes because of higher reproductive performance. Introduction of temperate sheep breeds can only be an advantage if the growth of lambs from JTT ewes can be improved under Indonesian management conditions by the controlled use of exotic sires. However, in view of the poor reproductive performance of BLM ewes recorded here, and the evidence already cited of depressed breeding activity from temperate ewe breeds in tropical environments, crossbreeding JTT ewes with exotic sires beyond the first generation should be carefully evaluated to ensure that any improvements in lamb growth are not achieved at the expense of the early reproductive maturity, high fecundity, and capacity for frequent breeding of JTT ewes.

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