QUEENSLAND DEPARTMENT OF PRIMARY INDUSTRIES

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EFFECT OF THE RADICAL MULES OPERATION PERFORMED AT LAMB-MARKING ON SUBSEQUENT LAMB GROWTH RATES

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SUMMARY

Fifty South Australian x Peppin Merino ewe lambs ranging from 4 days to 6 weeks of age were mulesed in August 1968 in conjunction with lamb-marking on a property in the Augathella district of south-western Queensland. The radical Mules operation was used. Fifty ewe lambs of the same age and from the same flock were left unmulesed.

All wounds in lambs with plain and moderately wrinkled breeches healed within 3 weeks and those in the most wrinkled lambs healed by the fifth week.

Both treatment and breech fold type had significant effects on subsequent growth rates. Mulesing depressed growth rates during the 10 days after the operation, the effect being most marked in very wrinkled lambs. Following this period mulesed sheep grew at rates superior to those of unmulesed animals so that there was only a slight difference in average body-weight 6 months after mulesing.

I. INTRODUCTION

Graziers in south-western Queensland have reported that organophosphate insecticides no longer afford any long-lasting protection from blowfly (*Lucilia cuprina*) strike in sheep. The Animal Research Institute, Yeerongpilly, has confirmed the presence of resistant strains of blowfly. Because of this other management practices must become increasingly important in blowfly control. Mulesing is a technique that offers an effective and permanent protection from breech strike.

Within the South-Western Statistical Division of Queensland approximately half a million ewe lambs are marked in years when seasonal conditions are favourable. More than one-third of these are subsequently mulesed, the usual practice being to mules after first shearing at approximately 5 months of age. However, lambs born during late winter and early spring reach this age in summer when temperatures are high and rainfall expectancy greatest. This makes the handling and care of mulesed sheep difficult. In addition to this, plagues of sandflies (*Austrosimulium pestilens*) and bushflies (*Musca vetustissima*) which follow heavy summer rains cause intense irritation of wounds in freshly mulesed sheep. For this reason mulesing is often delayed till crutching or shearing at 10–12 months of age, which leaves lambs fully susceptible to blowfly strike during their first year.

The most practical method of overcoming these problems would be to mules in conjunction with lamb-marking in early spring when temperatures are milder and fly plagues seldom a problem.

As many authors (Mackerras 1937; Graham 1941; Graham, Riches and Johnstone 1941; Lightfoot and McGarry 1964; Dun and Donnelly 1965; Anson, Beasley and McMeniman 1969; Beasley and Mullens 1969) have shown that the dual operation of mulesing and lamb-marking can be carried out successfully, an experiment was undertaken in 1968 to examine the effects of mulesing at marking on the growth and production of sheep and on the protection obtained against fly-strike in the south-western Queensland environment. These aspects were studied in relation to skin fold development around the breech. The healing of wounds was also studied.

II. MATERIALS AND METHODS

Location and environment.—The observations were made between August 1968 and February 1969 on a property located in the Augathella district of south-western Queensland (lat. 25° 47′S., long. 146° 34′E.). The property comprises mostly open, lightly timbered downs and brigalow (*Acacia harpophylla*) and gidyea (*Acacia cambagei*) scrubs. The principal plants on the open downs are curly Mitchell grass (*Astrebla lappacea*) and white spear grass (*Aristida leptopoda*).

Good winter rains in July 1968 had produced excellent pasture conditions, but without effective follow-up rain in spring the pastures were quickly reduced to large stands of dry herbage with very little grass. No rain fell in November and February and rainfall for December and January, 1·35 and 2·46 in. respectively, was ineffective under the prevailing pasture conditions. Near-century summer temperatures and the failure of summer rains maintained the dry and dusty conditions and by February the area was in a state of worsening drought.

Sheep.—The sheep used in this experiment were strong to medium-wooled South Australian x Peppin Merinos born on the property during July-August 1968. One hundred ewe lambs were selected at random for the experiment from a group of 1,000 lambs which were to be mulesed at lamb-marking. The ages of the selected lambs ranged from 4 days to 6 weeks, and were representative of the original group.

Treatments, measurements and management.—On August 16, 1968, the selected lambs were divided at random into two groups. All lambs were ear-tagged, body-weights were recorded and the amount of skin wrinkle on the breech was recorded using the photographic standards for adult sheep developed by Turner *et al.* (1953).

One group was marked and mulesed using the radical Mules operation (Dun 1954). The wounds were treated with a diazinon powder to minimize the effects of a concurrent plague of bushflies which continued for the first 3 weeks of the experimental period. From this group lambs representative of the various breech fold types were selected. These were photographed before and after the operation. The lambs in the second group were marked but not mulesed.

Following marking both groups were run with their dams as one flock in an open Mitchell grass downs paddock until weaning. During the 5 weeks from August 26 to September 23, 1968, body-weights of all lambs were recorded each week and photographs taken to record the condition of wounds. These weekly weighings were discontinued at the completion of healing. At this time unmulesed animals were photographed for comparison.

The lambs were weaned in December 1968 when it was necessary to carry out an early shearing because of the drought conditions. The experimental animals were weighed on February 11, 1969, just prior to the disposal of all weaner sheep on the property.

In order to examine the association between breech fold and performance, sheep in each treatment group were allocated into three types based on their breech scores at marking. Plain breeched included scores 0 to 1, moderately wrinkled breech had breech score 2 and the very wrinkled animals had breech scores 3, 4 and 5.

Statistical analyses.—Daily weight changes were calculated for the periods August 16 to August 26, 1968, and September 23, 1968 to February 11, 1969. Linear regression lines for the change in body-weight with time were fitted to the weekly data for the period August 26 to September 23, 1968. The slopes of these lines were used as the growth rates for the analysis.

The method of fitting constants was employed in analysing data from each period of the experiment. However, this method was not appropriate for data from the second period because of the existence of interactions between breech fold type and treatment. These data were re-analysed using the method of weighted squares of means (Snedecor and Cox 1935). Differences between class means were examined by *t* tests.

III. RESULTS

Because of the extremely dry conditions during the experimental period, and the consequent absence of blowfly strike in both groups, no comparison of the effectiveness of mulesing as a protective measure against strike could be made.

Figure 1 shows the changes in average body-weight for the two groups during the healing period (August 16 to September 23, 1968). The average body-weight of the mulesed group in the weeks immediately following the Mules operation was lower than that of the untreated group. During this period the difference decreased and by February 11, 1969, only 0·5 lb separated the two groups. The mulesed group averaged 61·4 lb and the untreated group 61·9 lb.

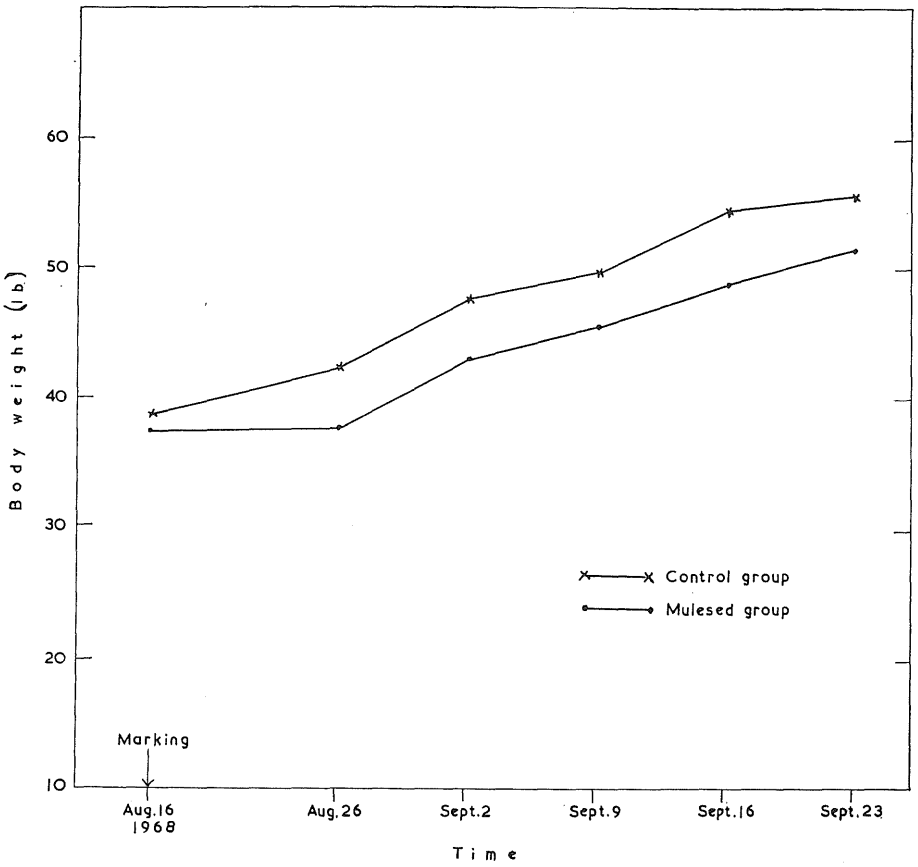


Fig. 1.—Changes in average body-weight for two groups of ewes, one mulesed and the other left untreated at lamb-marking.

Lamb growth rates during the three periods August 16 to August 26, 1968, August 26 to September 23, 1968, and September 23, 1968, to February 11, 1969, for the three breech fold types and two treatments are presented in Table 1.

TABLE 1

GROWTH RATES OF EWES WHICH WERE EITHER MULESED OR NOT MULESED (CONTROL) AT LAMB-MARKING

Period and Breech Fold	Mulesed (lb per day)	Control (lb per day)
August 16 to August 26, 1968—		
Plain breech	0·087 ± 0·050 † (23) *	0·408 ± 0·047 (26)
Moderately wrinkled breech	0·031 ± 0·067 (13)	0·500 ± 0·083 (8)
Very wrinkled breech	−0·207 ± 0·064 (14)	0·260 ± 0·062 (15)
Average	0·010 ± 0·034 (50)	0·378 ± 0·080 (49)
August 26 to September 23, 1968—		
Plain breech	0·488 ± 0·019 (23)	0·490 ± 0·018 (26)
Moderately wrinkled breech	0·530 ± 0·025 (13)	0·411 ± 0·032 (8)
Very wrinkled breech	0·436 ± 0·024 (14)	0·409 ± 0·023 (15)
Average	0·484 ± 0·013 (50)	0·452 ± 0·013 (49)
September 23, 1968, to February 11, 1969—		
Plain breech	0·084 ± 0·008 (20)	0·070 ± 0·008 (22)
Moderately wrinkled breech	0·080 ± 0·010 (12)	0·018 ± 0·014 (6)
Very wrinkled breech	0·043 ± 0·010 (12)	0·018 ± 0·009 (14)
Average	0·072 ± 0·005 (44)	0·045 ± 0·005 (42)

† Standard error of mean * Number of animals

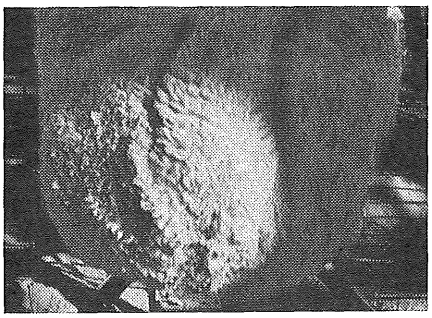
Analysis of data for the first 10 days showed a significant ($P<0·05$) effect of both treatment and breech fold type on growth rate. The mulesed lambs suffered a significant depression in growth rate compared with the untreated ones. The depressed growth rate of mulesed animals was most marked in the very wrinkled sheep, which lost weight in this period. Plain animals were least affected and moderately wrinkled sheep showed growth rates intermediate between the other types.

In the next 4 weeks there was a significant interaction between breech fold type and treatment. During this period both mulesed and unmulesed sheep in the plain group grew at similar rates. There was also little difference between the two treatments in the very wrinkled group. However, in the moderately wrinkled sheep there was a significant difference between the treated and control groups, the mulesed group having a superior growth rate.

In the final period of the experiment both treatment and breech fold type had an effect which was statistically significant. Mulesed animals grew at a significantly faster rate than the untreated ones, while plain breeched lambs grew faster than very wrinkly lambs. Among the mulesed groups, plain and moderately wrinkled lambs grew at similar rates, while in the control group moderately and very wrinkled lambs grew at the same rate, which was significantly lower than the growth of plain lambs.

Observations of the healing of wounds in each group showed that relatively plain lambs healed very rapidly. All lambs in both the plain and the moderately wrinkled groups had healed within 3 weeks. In the wrinkliest animals all wounds

were satisfactorily healed by the fifth week. Figure 2 shows the extent of wounds and the healed areas in two lambs of similar initial body-weight, but with contrasting degrees of breech fold development. The mulesed sheep showed a marked reduction in soiling and an increase in the bare area. This was in marked contrast to the heavily soiled breech area of untreated sheep (Figure 3).



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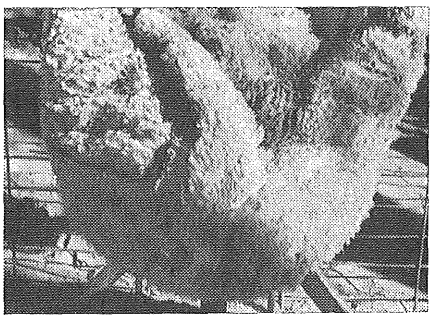

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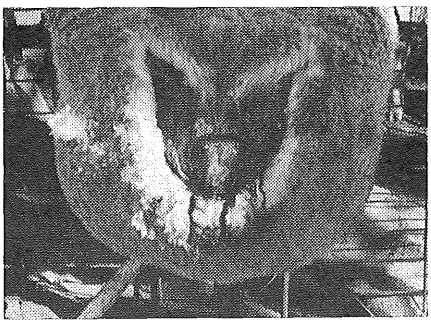

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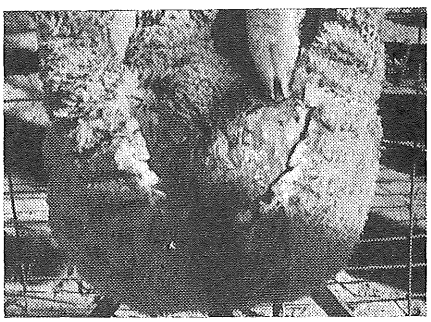

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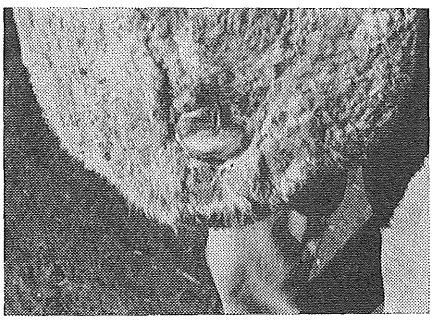

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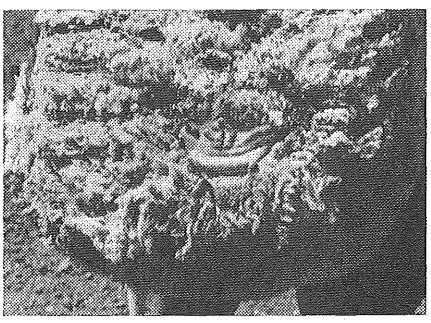
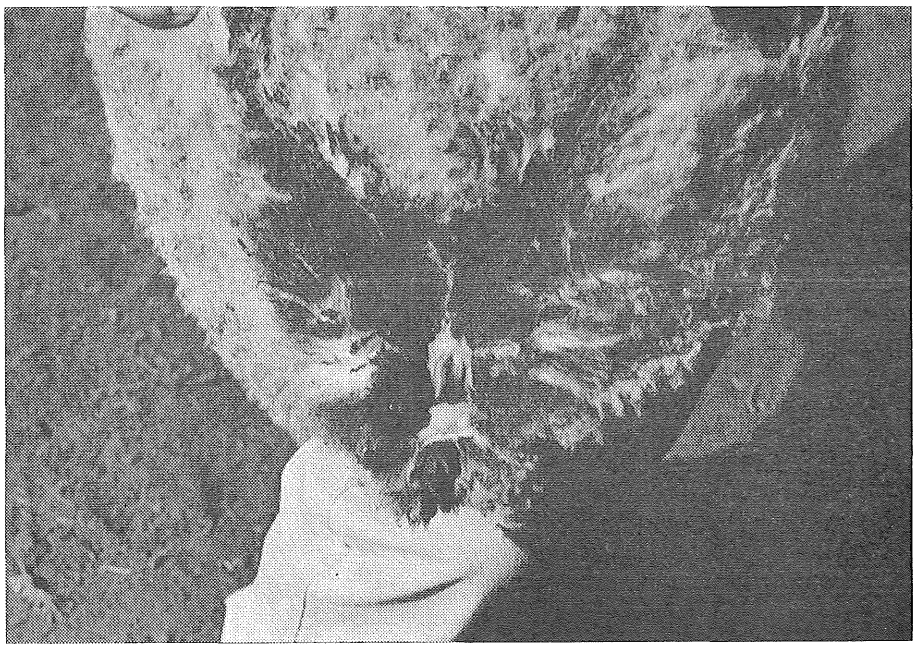


No. 555 Body-weight 51 lb 23.9.68

Fig. 2.—Extent of the wounds and the completion of healing in a plain (left) and a very wrinkled (right) lamb of similar initial body-weight. Top, before mulesing. Centre, after mulesing. Bottom, healing completed.



No. 558 Score 3 Body-weight 58 lb 23.9.68

Fig. 3.—Breech area of an untreated sheep of the very wrinkled type 5 weeks after lamb-marking.

IV. DISCUSSION

The results show that lambs between 4 days and 6 weeks of age can be mulesed at their normal marking time during the spring or early summer months in this environment. There was a severe check to growth following mulesing which was very pronounced in very wrinkled lambs, but this was only for a short time and mulesed lambs were able to compensate for this early setback. The overall result agrees with those from other areas (Lightfoot and McGarry 1964; Dun and Donnelly 1965) although the experiments concerned did not define this early depression of growth rates as observations were not so frequent after marking. The degree of setback in the first 10 days appeared to be related to the degree of breech fold development, with the plainest animals being least affected. The very wrinkled lambs, for which the operation was necessarily more extensive, were most severely affected by the operation and lost weight during this time. This cessation of growth occurred only between mulesing and the first weighing 10 days later. In the next 4 weeks mulesed sheep compensated for this early setback and grew at rates slightly superior to those of the control sheep. During the final period of the experiment compensatory weight gains were more marked.

While the stress imposed by the operation itself may have been largely responsible for the reduced weight gains of the mulesed group, the additional stress imposed by the bushfly plague may have been a contributing factor. It could well have delayed healing, especially in the more extensive wounds of the very wrinkled animals.

The operation used by other workers in investigating mulesing at marking was the modified Mules and tail strip technique (Lightfoot and McGarry 1964; Dun and Donnelly 1965). In this experiment the radical Mules operation was used

and the results show it to be quite successful when used at marking. Previous field experience in this area had shown that the radical Mules operation gave the most satisfactory results when mulesing weaners. However, in areas with little tree cover, the radical operation may have some disadvantage as it exposes the animal to sunburn.

Mulesing has gained fairly wide acceptance in south-western Queensland. The overall percentage of sheep mulesed in the South-Western Division is about 42 and in some areas it is as high as 50. This compares with a State average of 39% (Anson, unpublished data). However, only a very small number of graziers in the area mules lambs at marking. In the Murweh Shire 2·4% of all sheep-owners have adopted this practice, which represents only 5% of those graziers who mules their sheep, while in the Quilpie Shire only 1·5% mules at lamb marking, or 4·25% of those who mules sheep as a husbandry practice.

The results of this experiment indicate that more graziers could further protect their sheep by mulesing at lamb-marking without seriously depressing overall lamb growth. As such a large proportion of graziers mules their sheep later in life, this simple technique offers a practical and economic alternative to the use of increasingly ineffective insecticides.

V. ACKNOWLEDGEMENTS

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