RESEARCH NOTE
THE OCCURRENCE AND INHERITANCE OF
WATTLES IN YANKASA SHEEP

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The presence of wattles in sheep is controlled by an autosomal dominant gene (W) with complete or incomplete penetrance (Casu *et al.*, 1970; Singh *et al.*, 1970). In the Sardinian breed of sheep the gene frequency for absence of wattles (w) was 0.87. In this breed, ewes with wattles tended to have higher prolificacy and higher milk yield than those without wattles (Casu *et al.*, 1970). The incidence of wattles in Malpura and Rambouillet x Malpura F₁ crossbred sheep were reported to be 11.52 and 7.24%, respectively, and unilateral occurrence of wattles on the left side only was observed in both breed groups (Singh *et al.*, 1970). The gene frequency of W in the Malpura and the crossbreds was 0.06 and 0.04 respectively. However, Singh *et al.*, (1970) reported significantly lower fertility in wattled ewes compared to ewes without wattles. Thus, breed differences appear to modify the effect of wattles on fertility.

The study was carried out on the Yankasa sheep flock of the National Animal Production Research Institute, Zaria, Nigeria. Overall, 806 sheep were involved, consisting of 405 adult ewes, 63 adult rams and 338 lambs aged 1 to 5 months.

Genotypic and gene frequencies were determined using the Hardy-Weinberg principle:

$$(p + q)^2 = 1.$$

where p and q are frequencies of dominant and recessive alleles respectively, in a panmictic population. Inheritance of wattles was studied using breeding records from 122 matings. The effect of wattles on weaning weight was studied using one-way analysis of variance on records of 200 lambs, adjusted for age of dam, sex, litter size and to 90-day weight. The fertility index of the ewe was calculated as:

$$F = (n(y - Y) 100) / (1 + (n - 1)t)$$

where F is fertility index, n is the number of lambings, y is the average litter size of the ewe, Y is the

average litter size of the whole flock and t is the repeatability of litter size. The incidence of apparent abortions was calculated as the percentage non-returns failing to lamb.

Of the 806 sheep examined, 582 (72.2%) had no wattle, compared to 224 (27.8%) with wattles, giving a ratio of 2.6 : 1 respectively. There appeared to be no sex difference in wattle incidence; 26.6% of 177 female lambs had wattles, compared to 25.9% of 158 male lambs with wattles. The occurrence of wattles was bilateral in all cases. The gene frequency for absence of wattles (w) in 806 sheep was 0.85. The genotypic frequencies were 0.72, 0.26 and 0.02 respectively for homozygous recessive (ww), heterozygous (Ww) and homozygous dominant (WW) individuals. The phenotypes of offsprings from matings between different combinations of wattled and non-wattled sheep are shown in Table 1. The proportion of wattled parents of genotype WW is expected to be very low, in view of the low frequency of the dominant gene W.

Weaning weight in 140 non-wattled lambs averaged 9.00 ± 0.22 kg but did differ significantly ($P > 0.05$) from that of 60 wattled lambs (8.73 ± 0.28 kg). In naturally mated ewes, the mean number of oestrous periods per conception was 1.38 for 236 non-wattled and 1.35 for 105 wattled ones, the difference being non-significant ($P > 0.05$). For the same ewes, the percentages of apparent abortions for non-wattled and wattled ones (8.47 vs 8.57) did not differ significantly ($P > 0.05$). Average litter sizes (1.07 ± 0.05 vs 1.15 ± 0.05) and mean fertility index (8.09 ± 19.4 vs 33.72 ± 19.8) for 31 non-wattled and 21 wattled ewes respectively with 5 or 6 lambings also did not show any significant difference ($P > 0.05$). However, in the same group of ewes which have been under selection for fertility, the ratio of wattled to non-wattled individuals was 1.48:1, compared to 2.6:1 overall ratio. This suggests that selection pressure was against non-wattled sheep.

TABLE 1. PHENOTYPE OF PROGENY FROM MATINGS BETWEEN
DIFFERENT COMBINATIONS OF WATTLED AND NON-WATTLED
YANKASA SHEEP

Sire		Dam		Progeny	
Phenotype	Genotype	Phenotype	Genotype	Number	Type
Wattles-	ww	Wattles-	ww	69	Wattles-
Wattles-	ww	Wattles +	Ww	21	Wattles-
				23	Wattles +
Wattles +	Ww	Wattles-	ww	3	Wattles-
				1	Wattles +
Wattles +	Ww	Wattles +	Ww	4	Wattles +

The predominance of non-wattled sheep in the present study agrees closely with the findings of Casu et al. (1970) for Sardinian sheep and Singh et al. (1970) for Malpura and Rambouillet x Malpura crossbred sheep. However, the gene frequency of 0.85 for the absence of wattles obtained for Yankasa sheep in this study is closer to that of Sardinian sheep (0.87) than to Malpura (0.94) and Malpura x Rambouillet crossbred sheep (0.96). Results of the mating experiments in the present study also agrees with the postulation that the presence of wattles is controlled by an autosomal dominant gene. However, unlike in the other sheep reported above, the W gene in Yankasa sheep appears to exhibit complete penetrance. There appears to be breed differences associated with the effect of wattles on fertility in sheep. While higher lambing rate and higher milk yield seemed to be associated with wattled Sardinia sheep (Casu et al., 1970), significantly lower fertility rates were reported in wattled Malpura and Rambouillet x Malpura crossbred sheep (Singh et al., 1970). In the wider range of fertility traits examined in this study, although no significant effect was found, wattled Yankasa sheep tended to have lower number of oestrous period per conception, higher litter size and higher fertility index, while non-wattled

sheep had fewer apparent abortions. Non-wattled lambs also tended to have higher weaning weight. The indication of a selection pressure against non-wattled sheep in a flock being selected for higher litter size in the present study deserves further study with larger numbers of ewes. The evidence is not yet conclusive for an effect of wattles on fertility in sheep.

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