INBREEDING AND POPULATION STRUCTURE STUDIES IN THE NEW ZEALAND ANGUS BREED

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To my Mother and Father

ABSTRACT

The breed structure and genetic history of the New Zealand pedigree Angus breed were analysed by Robertson and Asker's (1951) modification of the Wright-McPhee (1925) pedigree sampling method.

The pattern of the breed structure obtained is generally similar to that found in other studies, but it is both diffuse and dynamic owing to the present rapid expansion of the breed. There are changes taking place in the herd composition of the major breeders' herds and many new herds have yet to find their level in the structure.

Considerable emphasis has been placed on the use of imported animals in the development of the breed. Of all herds registering in Volume 61 of the herd book, 20.5% used imported sires, and the percentage of genes in the breed in 1966/67 derived from animals imported since 1863 was 85.4.

The most important herd in 1969 has a genetic contribution to the breed of 21.9 per cent, while the contributions of the four next most important herds were 8.72, 8.7, 4.7 and 3.7 per cent. In the four-generation pedigrees from which these figures were derived, the contribution of imported animals was 42.4%. The relationship between herd size and importance of the herd was considered. Herd duration was also discussed, in so far as it relates to improvement of the breed.

The animal with the highest relationship to the breed was Blackleg (11.65% in the 1900 pedigree sample). But overall, the most important animal over the period 1900-1966/67 was Lancer of Advie. Of the 33

sires and 9 dams whose direct relationships are 3.0% or more in any of the 8 sample years, 19 sires and 3 dams were imported.

The total inbreeding in 1966/67 (base year 1863) was 1.80%. This comprised 0.09% current inbreeding, 0.95% long-term inbreeding, and 0.76% strain inbreeding. The index of subdivision calculated from the non-current and long-term inbreeding is 1.79, indicating that there is only a slight tendency towards family formation in the breed.

The effective generation length is approximately 5.6 years. About 50-56% of the animals in the 1966/67 sample were sired by bulls 4 years old or younger, while about 38% are from dams 4 years or younger.

It is unlikely that there is much genetic variation between herds. This is because bulls from major breeders' herds are used widely throughout the breed while about 80 percent of sires and 37 per cent of dams are bred in herds other than the one in which they were used.

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"Lewontin confessed that each year he lectures on inbreeding, and each year he realises that he does not yet completely understand it."

Bruce Wallace, 1968.

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