Genetic Relationship between Maximum Hematocrit Values and Hemoglobin Type in Sheep

Abstract. *A significant association between seasonal maximum hematocrit values and hemoglobin type has been shown to exist in sheep. Both characters are known to be under genetic control.*

Recently (*1*, *2*) it was shown that seasonal maximum hematocrit values in normal sheep are under genetic control. In other studies it was demonstrated that hematocrit values, suitably corrected for body weight, are a function of the total volume of circulating red blood cells (*3*). It was also demonstrated that the total volume of the red blood cells is an important factor influencing the outcome of experimental epidemics of disease due to a blood-sucking parasite (*4*).

Hemoglobin type in sheep in the AB system is simply inherited as an allelic pair (*5*). A number of observations suggest that the different gene frequencies in various populations of sheep are the result of selection for one or the other hemoglobin type (*6*). There is evidence that hemoglobin type is correlated with hematocrit value (*7*, *8*) and with blood volume (*8*).

Our purpose here is to report on the classification of the sheep in the flock maintained for parasitological investigations at the New York State Veterinary College with respect both to the best estimate of their hematocrit values (*3*) and to their hemoglobin types. There were 124 ewes, 26 rams, 23 yearlings, and 64 lambs (born in 1963) available for this classification.

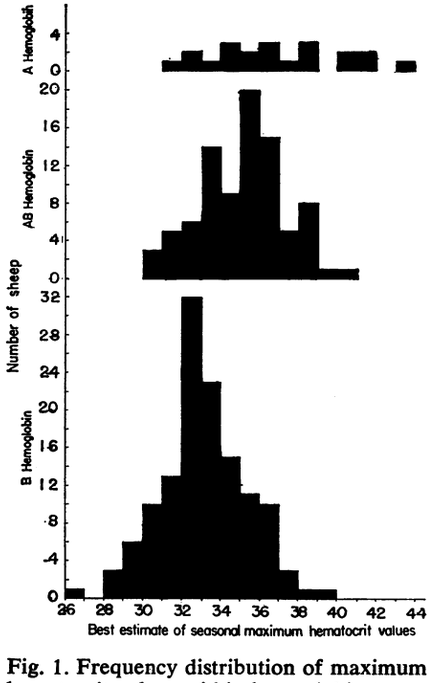

Fig. 1. Frequency distribution of maximum hematocrit values within hemoglobin types.

Figure 1 shows that there is a close relationship between hemoglobin types (*5*) and the best estimates of maximum hematocrit values (*2*). The mean maximum hematocrit values for each hemoglobin type form a series where A is greater than AB, which is greater than B. The differences between these values is highly significant (*9*).

It is therefore of interest that, other things being equal, an animal with a low erythrocyte volume in this flock has a smaller chance of surviving a natural challenge with *Haemonchus contortus* than an animal having a greater erythrocyte volume (*4*), and that animals with hemoglobin A in Australia may show lower fecal egg counts than animals with hemoglobin AB (*10*).

Although no direct experimental data are available, observations on the Veterinary College flock have suggested that low maximum hematocrit values may be associated with mortality subsequent to winter shearing. It is known that sheep breeds indigenous to cold environments tend to have high gene frequencies for hemoglobin A (*5*).

These observations demonstrate that two genetically controlled characters, a phenotype boundary (maximum hematocrit) and a genetic polymorphism (hemoglobin type), are significantly associated in sheep. They may be important in relation to the reaction of an animal to its environment.

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Granular Pneumocytes: Electron Microscopic Evidence of Their Exocrinic Function

Abstract. *The contents of the lamellar bodies of granular pneumocytes are normally released into the alveolar lumen. Exposure of guinea pigs to an atmosphere containing carbon dioxide causes the formation of abnormal lamellar bodies and a significant increase in the pulmonary surface tension. The eventual return to a normal pulmonary surface tension coincides with the formation of normal lamellar bodies.*

The discovery of the surface active agent of the lung (*1*) has prompted several investigators to study the chemical composition and origin of this substance. There appears to remain little doubt about the lipoproteinaceous nature of the surfactant (*2*). The evidence for the cellular site of production or assembly of this substance, or both, is circumstantial, yet it suggests strongly a certain type of transformed mito-