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Relationship between total and differential leukocyte count changes in early lactation and milk production in dairy cows

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This study was undertaken to find out the changes in total and differential leukocyte counts in dairy cows in early lactation and the relationship between such changes and milk production.

Blood samples from each of 62 dairy cows (mainly Friesians and Jerseys) were collected into 5 ml EDTA vials from the coccygeal blood vessels once a week for 8 weeks after calving. The blood samples were analysed for total leukocyte count (WCC) by a coulter counter. The differential leukocyte counts were made from Giemsa-stained blood smears; 200 cells were examined per count. The milk production rank (Wayne *et al.*, 1977) for each cow was obtained from the Queensland Department of Primary Industries, Dairy Division, Herd Production Recording Scheme.

The mean weekly WCCs and absolute differential cell counts were found and compared by Student's T-test. The WCC and absolute differential cell slopes (the linear regression coefficient for each respective parameter regressed on time-weeks) were found and these together with the overall mean values for each parameter were correlated to milk production rank according to the method of Anderson (1981).

The trends of WCC and the absolute differential leukocyte counts for the 8 weeks postpartum are shown in Fig. 1. The mean WCCs were higer in the first 2 weeks after calving and then fell significantly ($P < 0.01$) by the fifth week postpartum (Fig. 1). The slope of WCC (-0.26 ± 0.23) was negatively correlated ($r = -0.465$) to milk production rank. The differential leukocyte mean counts were highest for neutrophils ($P < 0.01$) and monocytes ($P < 0.05$), and lowest for eosinophils ($P < 0.01$) in the first week after calving. The mean lymphocyte counts did not show any significant change during the observation period (Fig. 1).

The significantly ($P < 0.05$) different mean WCCs and absolute leukocyte counts in the first week postpartum compared to the other weeks was due to stress of parturition and onset of lactation. Similar observations were reported by Morris (1954). The negative relationship between WCC slope and milk production rank suggested that cows with a large decrease (slope) in WCCs postpartum might be those not able to adapt to the stress of early lactation after the stress of parturition. The value for WCC rose under stressful conditions and in sustained stress the value fell especially in animals not able to withstand prolonged stress (Paape *et al.*, 1974). Thatcher (1974) reported that cows not able to adapt to sustained stress during lactation had lowered milk production.

The results showed that in studies relating postpartum blood chemistry to milk production the WCC slope might be a better parameter than the mean WCC values. The results also showed that after the first 1-2 weeks postpartum the differential leukocyte counts do not show any significant changes with lactation.

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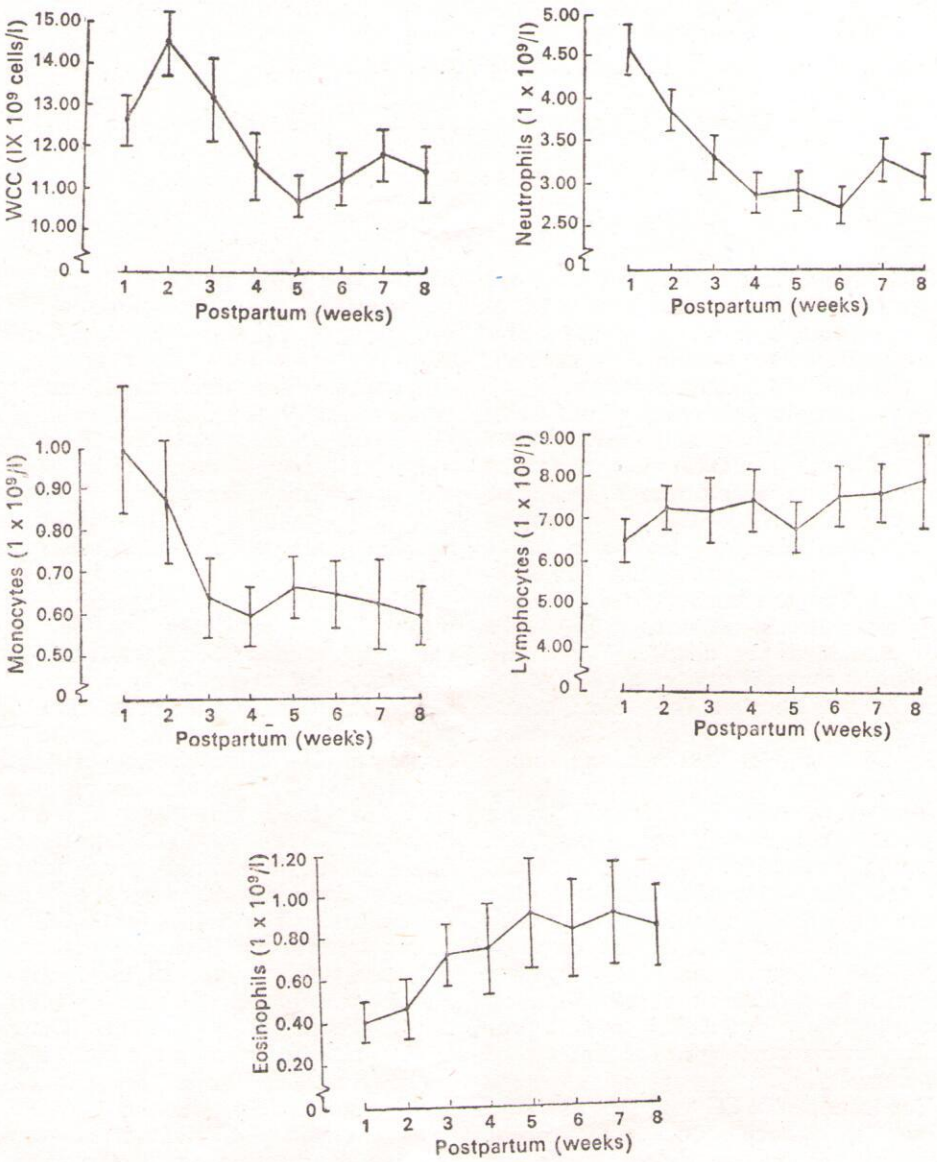

Fig. 1. Mean (± SE) changes in WCC, neutrophils, monocytes, lymphocytes and eosinophils in 62 dairy cows 1-8 weeks postpartum.

Table 1. Overall mean values and mean slopes of WCC and absolute differential leukocyte counts (N = 62)

Parameter	Mean* ± SEM	Mean slope+ ± SEM
WCC (× 10^9 cells/litre)	10.96 ± 0.35	−0.26 ± 0.23
Neutrophils (× 10^9 cells/litre)	3.48 ± 0.18	−0.18 ± 0.23
Lymphocytes (× 10^9 cells/litre)	6.60 ± 0.21	0.06 ± 0.21
Monocytes (× 10^9 cells/litre)	0.72 ± 0.04	−0.08 ± 0.06
Eosinophils (× 10^9 cells/litre)	0.65 ± 0.06	0.11 ± 0.26

SEM, Standard error of the mean; *, mean of the cows observations pooled; +, mean of all the individual cow slopes (regressed on weeks after calving).

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REFERENCES

Anderson, B. 1981. *Abstat*. pp. 112. Anderson-Bell, Cannon City, Colorado, USA.

Morris, P. G. D. 1954. Blood picture of the cow during a normal pregnancy and parturition *Brit'sh Veterinary Journal* **100** : 225–33.

Paape, M. J., Carrol, D. W., Kral, A. J., Miller, H. G. and Desjardins, C. 1974. Corticosteroids, circulating leukocytes and erythrocytes in cattle. Diurnal changes and bacteriologic status, stage of lactation and milk yield on responses to adrenocorticotropin. *American Journal of Veterinary Research* **35** : 355–62.

Thatcher, W. W. 1974. Effect of season, climate and temperature on reproduction and lactation. *Journal of Dairy Science* **57** : 360–68.

Wayne, D., Urouhart, N. S. and Ortega, A. J. 1977. Estimating Holstein lactating curves with gamma curves. *Journal of Dairy Science* **60** : 1308–15.