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SEASONAL VARIATION IN THE LEVELS OF SOME BLOOD COMPONENTS OF INDIGENOUS AND CROSSBRED SHEEP

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Some haematological and biochemical parameters were determined in two indigenous breeds of sheep and their crosses for a period of thirteen months in order to study normal seasonal changes in the levels of these components. It was found that the pattern of seasonal variations of blood components were similar and followed definite trends in the three breeds studied. Packed cell volume values were relatively higher during the dry months in the three breeds, but the crossbred tended to show higher values in all seasons. The biochemical parameters determined were generally lower during the dry months than the wet months. These differences were attributed to better nutrition during the wet months. It was concluded that the observed seasonal changes in the reported parameters were due to changes in rainfall and humidity rather than temperature during the year.

Key Words: Sheep, blood components, seasonal variation

In Nigeria, sheep is raised primarily for the production of meat contributes about 42,000 tonnes or 9.5% of Nigeria's total meat Sheep, together with goat contribute about 35% to the current capital ue of Nigeria's livestock (Adu 1980). Over 70% of the sheep population Nigeria is found in the Sahelo-Savanna regions where three of the four breeds of sheep (Balami, Yankasa and Uda) predominate. The Yankasa is the most numerous breed of sheep in Nigeria (Adu and Ngere 1979).

The importance of baseline information on biochemical and haematological values for a meaningful assessment of the health status as well as an intelligent interpretation of arising pathological conditions has been documented elsewhere in cattle (Schalm et al 1975), in camel (Banerjee et al 1962) in sheep (Grunsell 1955), in goat (Millson et al 1960) and in pigs (Copland 1976). In Nigeria, available reports are mostly on cattle (Oduye and Okunaiya 1971; Saror and Coles 1973; Olusanya 1977). The only reports on Nigeria sheep (oduye 1976; Thomas and Chiboka 1981) dealt with the West African dwarf sheep which is found in the humid zone and accounts for less than 30% of the total sheep population. This study was, therefore, an attempt to establish, within broad limits, normal haematological and biochemical values in indigenous sheep breeds found in the Sahel-Savanna Zones of Nigeria.

Materials and Methods

The study was conducted in Shika in the Northern-Guinea savanna belt. The physical environment of Shika has been described (Adu et al 1979). The sheep breeds (Yankasa, Uda and crossbred) used in the study have been described (Adu and Ngere 1979; Buvanendram et al 1981). Ten clinically healthy ewes, aged about 2 years, were randonly selected for each breed from experimental flocks kept at the Institute. The flocks were managed semi-intensively and were routinely dewormed and dipped against endo-and ectoparasites.

The experimental ewes were bled twice monthly for a period of 13 months starting from december, 1981. Bleeding was done early in the morning before turning the animals out to graze. At each bleeding, two blood samples were obtained by veinous puncture from each ewe. One sample(about 10 ml) was collected into a universal bottle containing 0.5 mg/ml EDTA (ethylene-diamine tetra-acetic acid) as anticoagulant, while the other sample was allowed to clot and the serum was decanted into another bottle. Packed cell volume (PCV) was determined by the micro haemetocrit method without correcting for trapped plasma, while haemoglobin (Hb) was determined by the Coulter haemoglobinometer method. Total protein (Tp) was determined by the refractometer method. Calcium, magnesium and potassium were determined by the use of atomic absorption spectrophotometer (Perkin-Elmer 290B) while inorganic phosphorus was analysed by the yellow method and result read off on spectronic 20 (Bausch and Lomb).

Climatological data were extracted from records of the Central meteorological section, Institute of Agricultural Research, situated about 2 km from the Institute. The seasons were classified into April to June, July to September, October to December and January to March corresponding to early-wet, wet, post-wet and dry seasons respectively. The significance of mean values was determined using "Student's t"-test as described by Snedecor and Cochran (1967).

Results and Discussion

Figure 1 shows the mean monthly variations in rainfall, temperature and relative humidity. Rainfall was highest in August and then fell sharply until December. It remained dry between December and February after which there was a gentle rise. Temperature fell steadily from April through August and then began to rise gently until October. There was a second steady decrease in temperature after October until January after which it started to rise until a peak was reached after March. The period between October and January corresponds to the 'harmattan' months when temperature and humidity are usually low. The prevailing weather at each of the seasons of observation show a mean temperature ranging from 17.8 to 20.5 °C with relative humidity ranging from 14.9 to 76.3%. Total precipitation ranged from zero to 190.7 mm. Table 1 shows mean values for some atmospheric parameters and blood components at the different seasons of the year. The amount of rainfall differed substantially between the different seasons, the period between July and September being the most humid. Seasonal variations in blood components were similar.

Figure 1:
Mean monthly rainfall, temperature & relative humidity

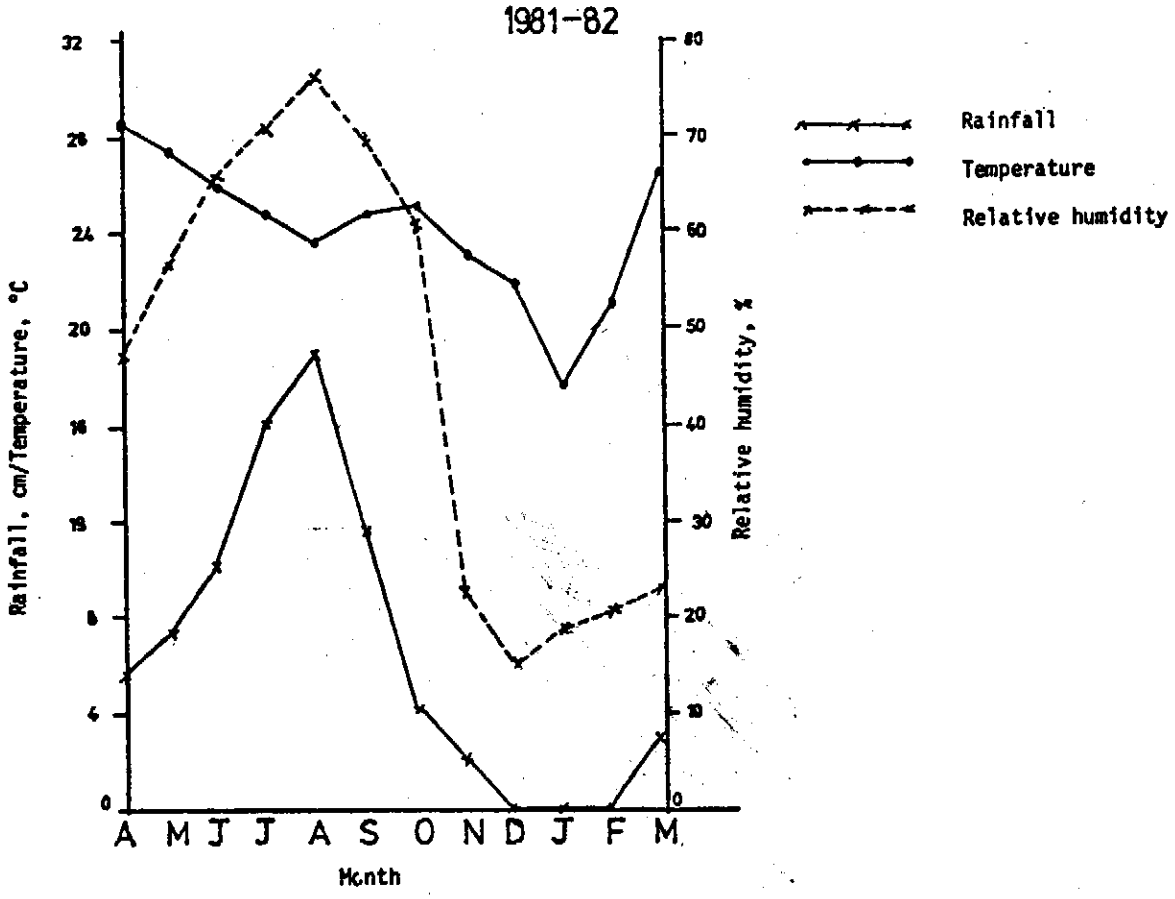

Figure 2 shows a graphic representation of the monthly variations in some blood components of the different breeds. Seasonal variations in the parameters shown appeared to follow a definite pattern. PCV values were lowest in the three breeds around November, while the values were highest around December in the Uda and Crossbred. In the Yankasa, PCV values rose steadilly from November to reach a peak in February. Generally the crossbred tended to have higher PCV values in all seasons. The mean PCV values of 23.6 $\pm$ 2.5, 24.3 $\pm$ 3.4 and 26.1 $\pm$ 2.7% in the Yankasa, Uda and crossbred respectively are within the range reported for many breeds of sheep (Schalm et al 1975) in general and for the West African dwarf sheep (Oduye 1976) in particular. However our reported values are lower than the PCV values of 30.5% (Holman 1944) and 35% (Hackett et al 1957). The low values might be due to haemodilution resulting from the consumption of water just before sampling. Hb values had smaller seasonal variations during the period under study, but the pattern of variation was similar to that of PCV. Mean Hb values were 8.4 $\pm$ 0.8, 8.5 $\pm$ 0.8 and 9.5 $\pm$ 1.1 mMol/litre for Yankasa, Uda and Crossbred respectively. There were no significant differences in Hb values during the seasons and between the breeds, although the crossbred tneded to have higher values.

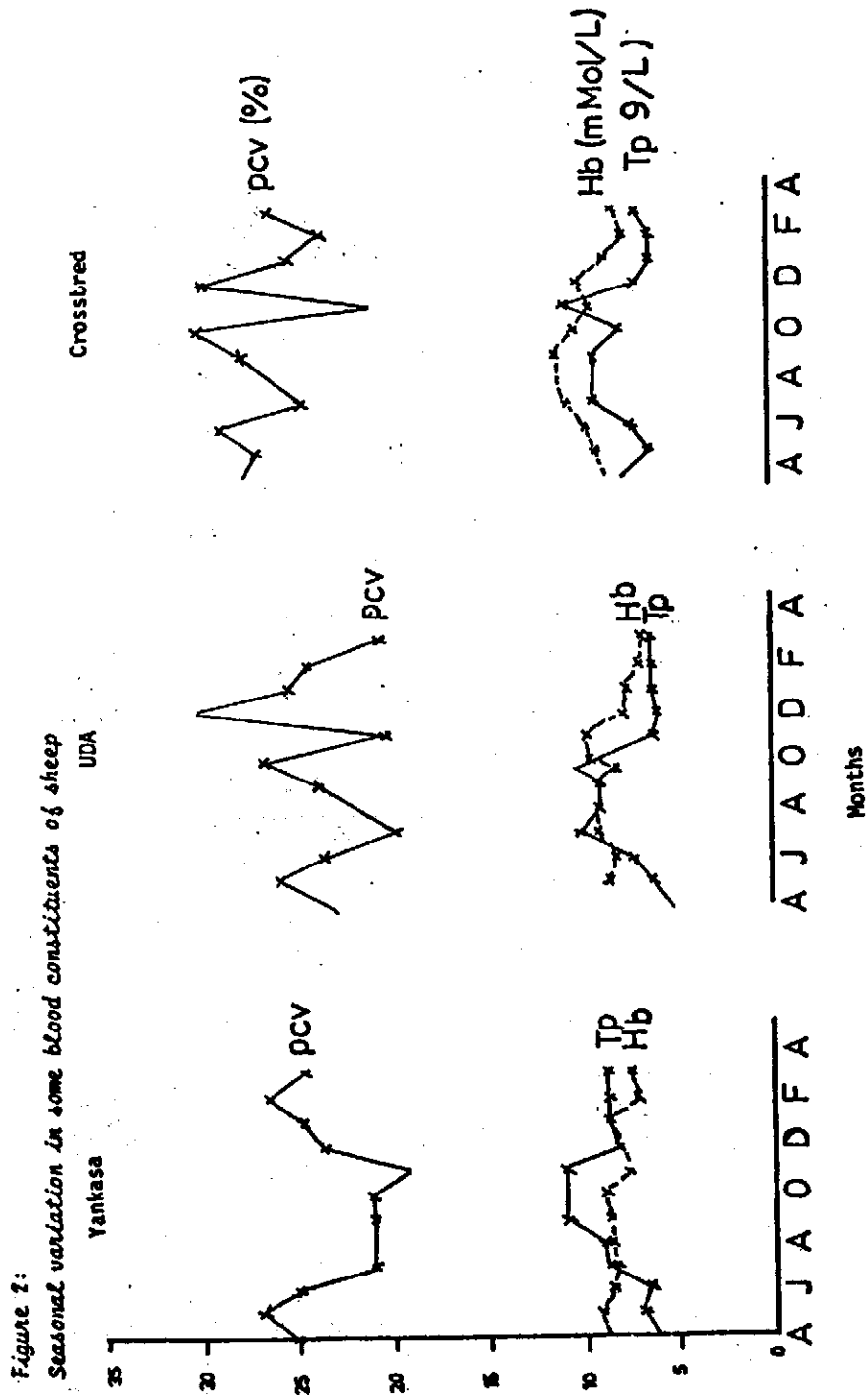

Figure 1:
Seasonal variation in some blood constituents of sheep

The overall mean value for Tp were 8.0 ± 1.8, 7.9 ± 1.9 and 7.8 ± 1.6 g/litre for Yankasa, Uda and Crossbred respectively. Tp values were relatively lower during the dry months than the wet months. This difference can be attributed to a better state of nutrition during the wet season when nutrient (protein) intake from fresh green pasture are higher.

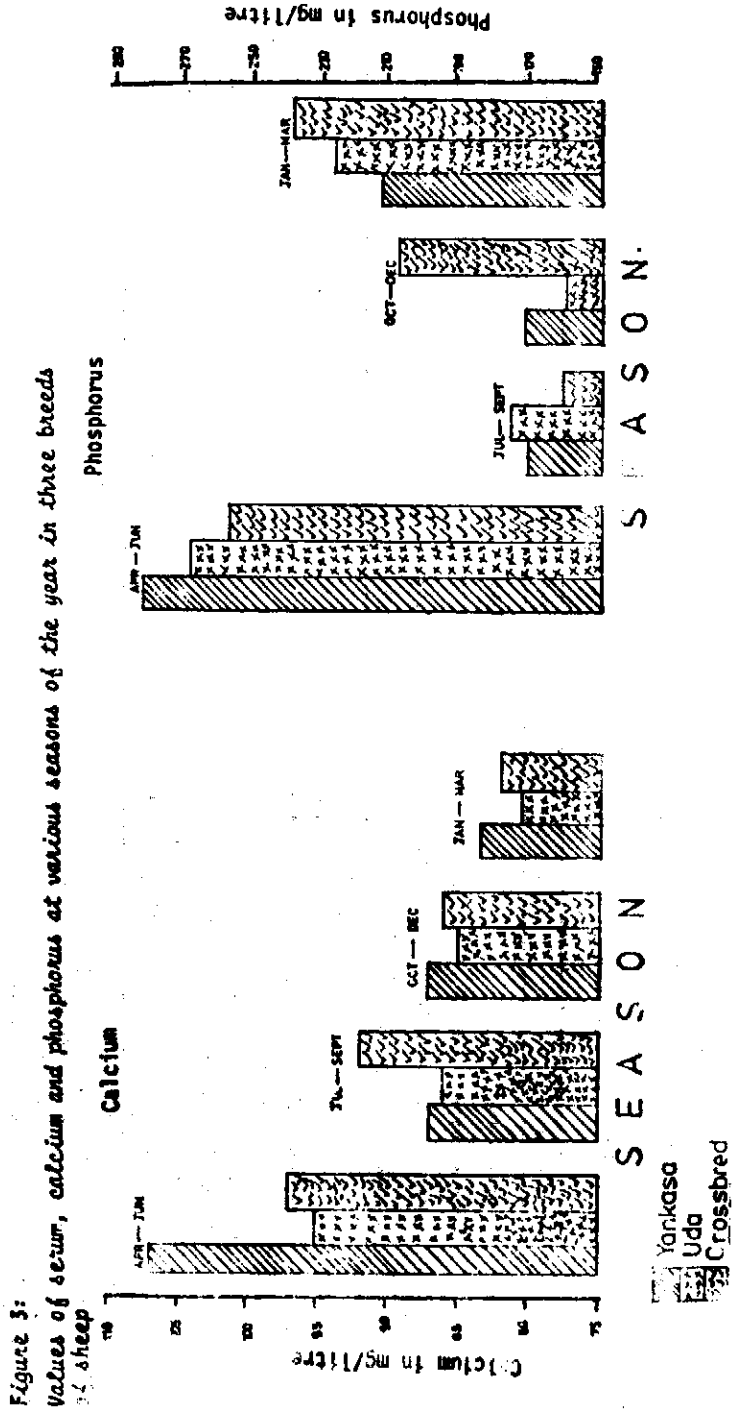

Figure 3: Values of serum, calcium and phosphorus at various seasons of the year in three breeds of sheep

Table 1:

Mean values of atmospheric conditions and some blood components at various seasons of the year (1981-82)

Components	April-June			July-Sept.			Oct.-Dec.			January-March		
Rainfall, mm	78.1			159.00			15.27			00.00		
Minimum temperature, °C	21.40			19.60			16.06			13.83		
Maximum temperature, °C	33.33			29.03			30.58			29.73		
Relative humidity, %	56.62			72.72			37.69			18.55		
	Y	U	C	Y	U	C	Y	U	C	Y	U	C
PCV, %	26.1	24.6	27.9	21.5	21.8	26.0	21.5	25.7	26.8	25.3	23.4	25.0
Hb, mMol/L	8.8	8.3	9.4	8.7	8.8	10.8	8.5	9.2	9.9	8.2	7.5	8.1
Total proteins, g/L	6.8	7.0	6.8	8.9	9.6	9.5	9.6	8.6	8.5	6.8	6.4	6.6
Calcuim, mg /L	106.9	94.6	97.2	86.6	86.0	92.2	86.5	85.7	86.5	83.5	80.5	82.3
Phosphorus, mg /L	52.4	54.9	56.9	47.9	63.3	54.0	28.3	36.3	33.9	49.8	54.2	53.5
Potassium, "	280.5	266.8	255.9	171.1	176.2	160.5	172.4	165.0	206.6	210.7	225.7	237.7
Magnesium "	27.4	21.4	23.4	19.7	19.0	18.1	20.3	22.2	20.4	22.6	24.0	26.8

Y = Yankasa
U = Uda
C = Crossbred.

Figure 3 shows a histographic representation of serum inorganic calcium and phosphorus. These serum components were highest during the early wet season months when lush pasture starts to grow. The mean values of calcium were 87.9 ± 16.1; 92.3 ± 13.5 and 92.5 ± 9.6 mg/litre for Yankasa, Uda and Crossbred respectively, while the mean values for phosphorus were 42.8 ± 18.2; 48.3 ± 19.3 and 50.2 ± 16.8 mg/litre in the respective breeds. The between and within breed differences in these parameters were not significant.

The generally higher values for the reported parameters in the crossbred can possibly be explained by their heavier body weight and by the fact that feed (nutrient) intake is a function of body weight. The study has shown that the seasonal changes in some blood components of sheep in the Northern Guinea Savanna Zone of Nigeria are more related to changes in the physical environment with particular emphasis on rainfall and relative humidity. These parameters need further investigation in relation to age and perhaps sex differences.

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