

BLOOD COMPOSITION OF RANGE BEEF COWS

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Normal levels of certain bovine blood constituents have been listed by many, including Dukes (1955), Gardner (1947), and Long *et al.* (1952). Several researchers have related blood composition to feed nutrients. Robinson (1966) relates a fall in hemoglobin, plasma protein, and hematocrit levels to the dry-season weight losses. Howes *et al.* (1957) have compared blood composition of Brahman and British breeds of cattle. Seasonal variation in some blood constituents of Hereford cows has been reported by Stufflebeam *et al.* (1964). Blincoe and Brody (1951) reported slightly higher hematocrit and hemoglobin values for Brahman cows than for Jersey and Holstein cows.

The purpose of this study was to determine the breed and seasonal differences in the level of certain blood constituents in Hereford and Santa Gertrudis cows in southern New Mexico.

Experimental Procedure

Samples of blood were collected by venous puncture from 15 grade Hereford and 15 grade Santa Gertrudis cows every 56 days during a 3-year period from December 1961 to September 1964. The soils, climate, grass species, and cattle are described by Herbel and Nelson (1966a, 1966b).

Hematocrit (volume percent of packed cells) was determined using 15 ml. graduated centrifuge tubes; serum albumin and alpha, beta and gamma globulin were by paper electrophoretic fractionation using the hanging strip type cell (Durrum) manufactured by Spinco Div., Beckman Instruments, Inc. and the following constituents were by methods described by Hawk *et al.* (1954): hemoglobin by the acid-hematin method of Cohen and Smith, total serum protein using the micro-Kjeldahl apparatus, serum non-protein nitrogen by a modification of the Folin Wu method, and plasma cholesterol by the method of Schoenheimer and Sperry.

Statistical analysis included analysis of variance (Snedecor, 1956) and Duncan's multiple range test (Duncan, 1955). Means were corrected for unequal subclasses.

Results and Discussion

Hemoglobin. Santa Gertrudis cows had higher levels of hemoglobin than the Herefords (average of 13.0 vs. 13.7). The levels were different at the bleeding dates (fig. 1) but the breeds varied together; the interaction of breeds and dates was not significant. The initial level

(December 1961) was high with a second peak in March 1963 and a third rise in June 1964. The low point was in August of each year.

Hematocrit. Hematocrit values (fig. 2) were highly correlated with hemoglobin levels. The average values were 44.7 volume % packed cells for Santa Gertrudis and 39.8 for Herefords with high peaks in the winter and low points in late summer. The breeds were different on all dates except September 1962 and December 1963.

Plasma cholesterol. Breeds, dates, and the breed x date interaction were significant for level of plasma cholesterol (fig. 3). The levels were high for both breeds in November 1962 and October 1964; however, additional peaks in April 1962 and May 1963 were recorded for the Herefords only.

Serum non-protein nitrogen. Date of bleeding was significant for level of NPN (fig. 4). Although the variation was considerable, lowest values tended to be during the winter. Breeds were significantly different on 7 of the 19 dates.

Serum protein. Highest levels of serum protein were in July, October and September in successive years (fig. 5). The low values were in February, March-May, and February in these same years. The average values were 7.41 mg. per 100 ml. of serum for both breeds with the Herefords significantly higher in April 1962 and the Santa Gertrudis higher in May and August 1963.

Serum albumin. A breed difference of 0.18 gm. of albumin per 100 ml. of serum was significant (fig. 6). The serum albumin level of both breeds varied together until the last year when the levels were lower for the Herefords.

Serum globulin. The total globulin level (fig. 7) tended to be low in the winter when feed conditions were poorest and high during the summer. The Santa Gertrudis had significantly lower levels of total serum globulins, but the breed x date interaction was also significant. Levels of gamma globulin were lowest in February 1962 and rose to a peak in July 1962. The trend was downward to March 1963 followed by higher levels in late summer and decreasing again in winter 1964. The levels were apparently related to quality of grass in the pastures. The alpha globulin level was variable with no definite time trend. The average beta globulin level was slightly higher for the Herefords. Lowest levels were in early 1962 with highest levels in late 1963 with no obvious seasonal trend related to forage quality.

Summary

Samples of blood from 15 cows each of grade Hereford and grade Santa Gertrudis were collected every 56 days for a 3-year period. Greatest breed differences were the higher levels for hemoglobin and hematocrit in the Santa Gertrudis and higher level of serum cholesterol in the Hereford cows. The feed x date interaction was significant for cholesterol with two extra seasonal peaks for the Herefords. Values for certain constituents, such as serum NPN, serum protein and total serum globulins, were low during seasons of poorest forage quality. Certain other values were also significantly different for breeds, dates, and breed x date interaction.

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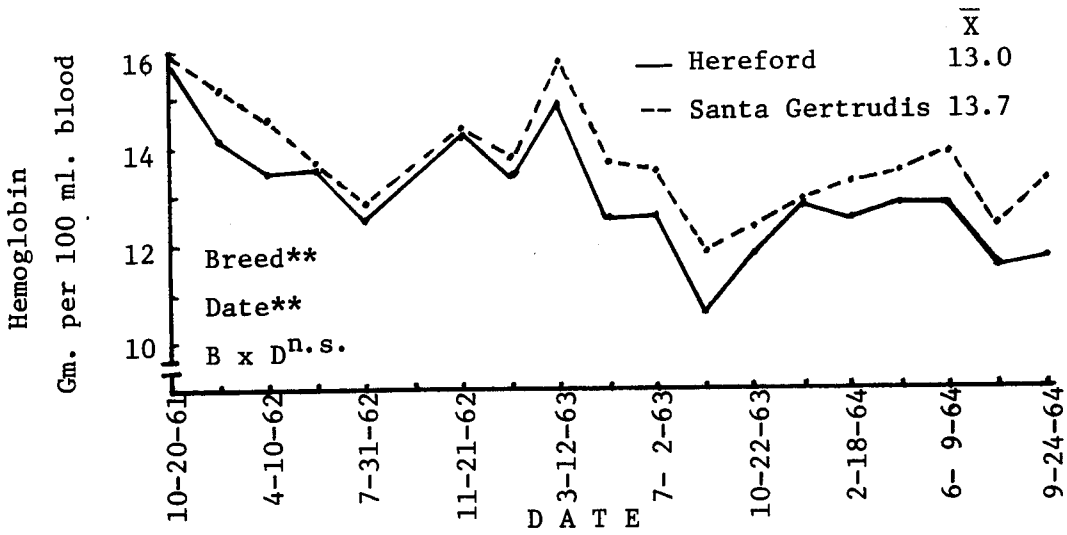


Fig. 1. Hemoglobin in blood of Hereford and Santa Gertrudis cows.

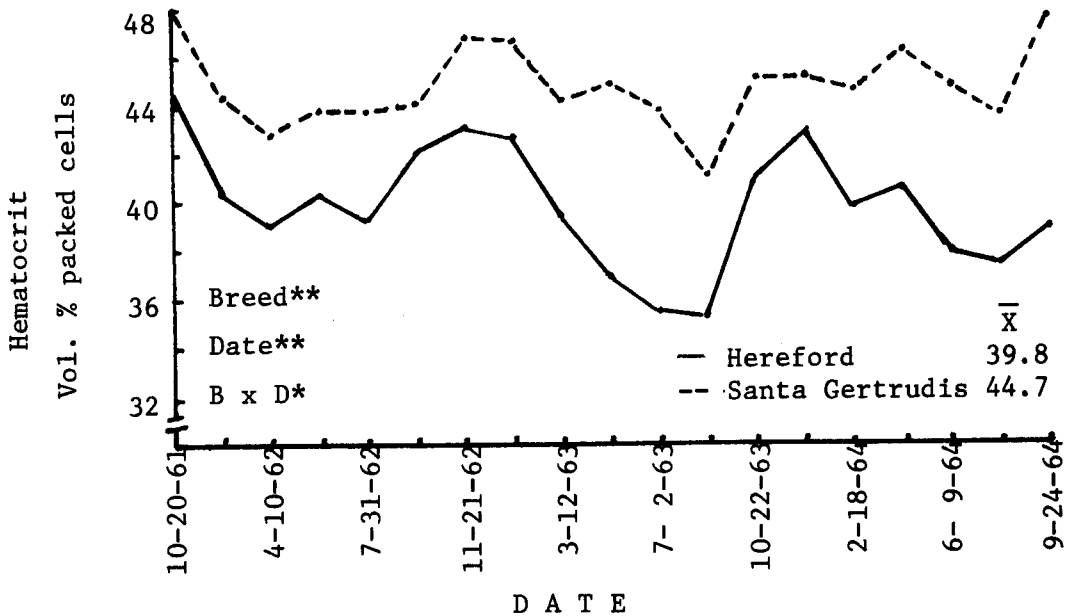


Fig. 2. Hematocrit values of Hereford and Santa Gertrudis cows.

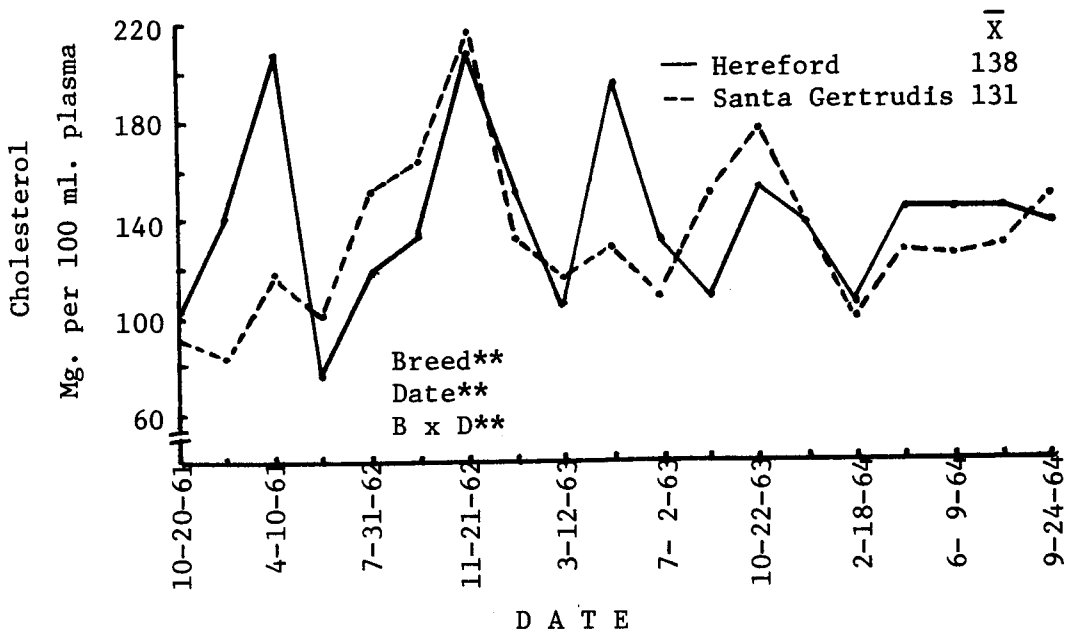


Fig. 3. Plasma cholesterol levels of Hereford and Santa Gertrudis cows.

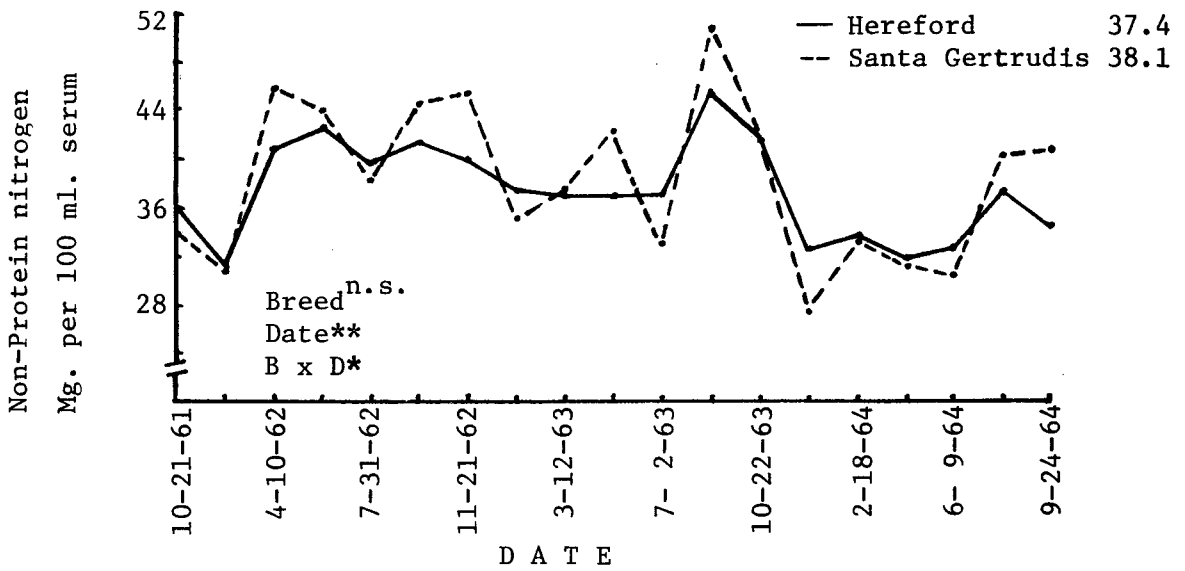


Fig. 4. Serum non-protein nitrogen levels in Hereford and Santa Gertrudis cows.

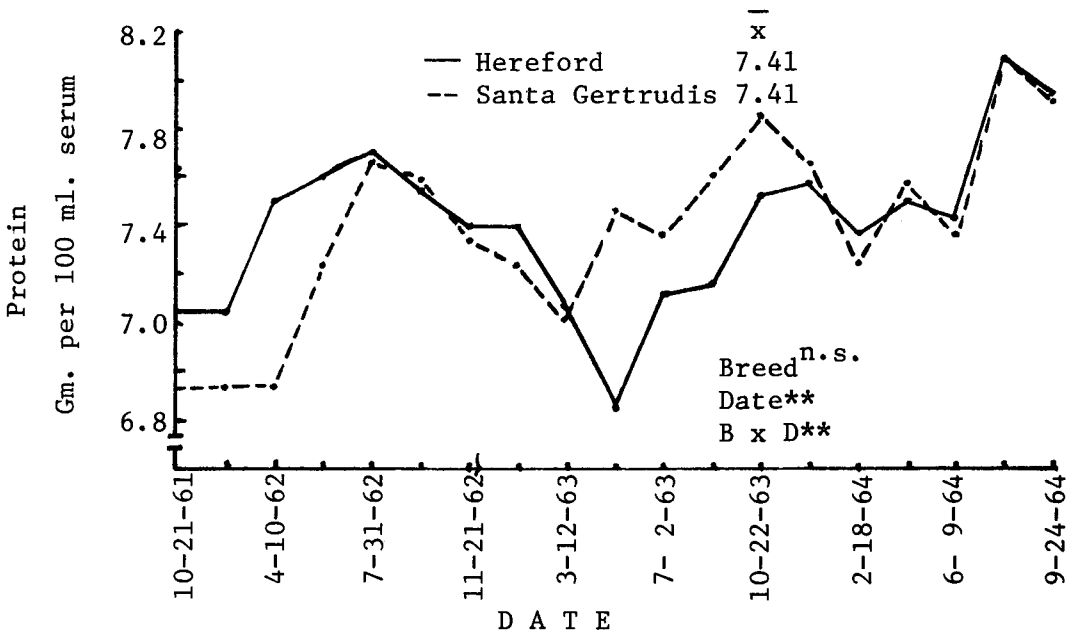


Fig. 5. Serum protein levels in Hereford and Santa Gertrudis cows.

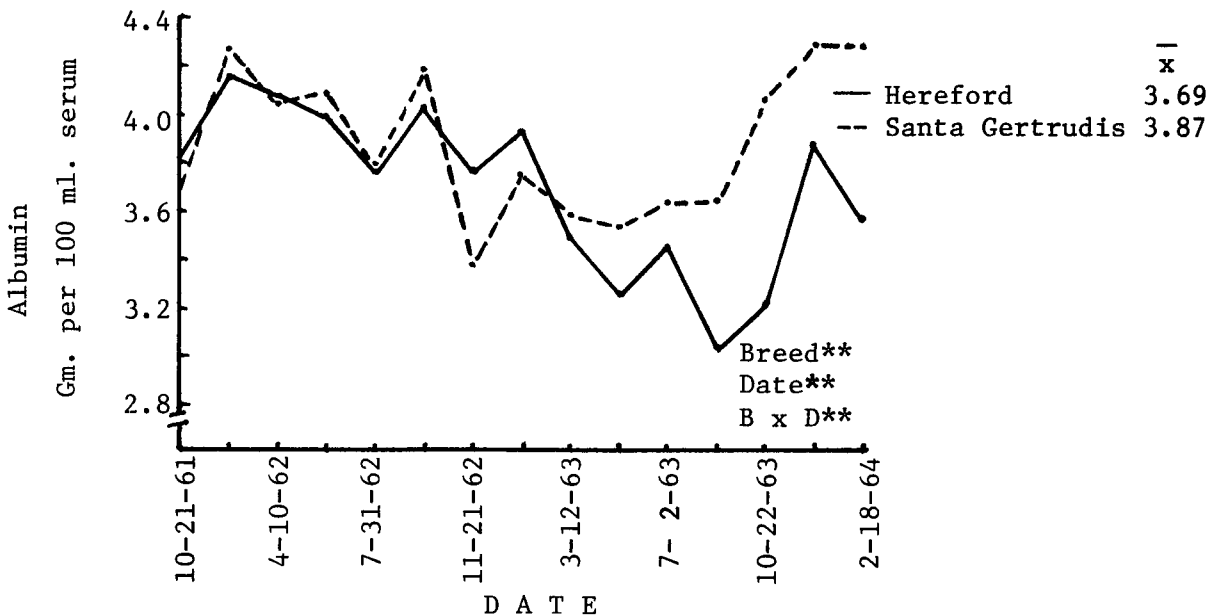


Fig. 6. Serum albumin levels in Hereford and Santa Gertrudis cows.

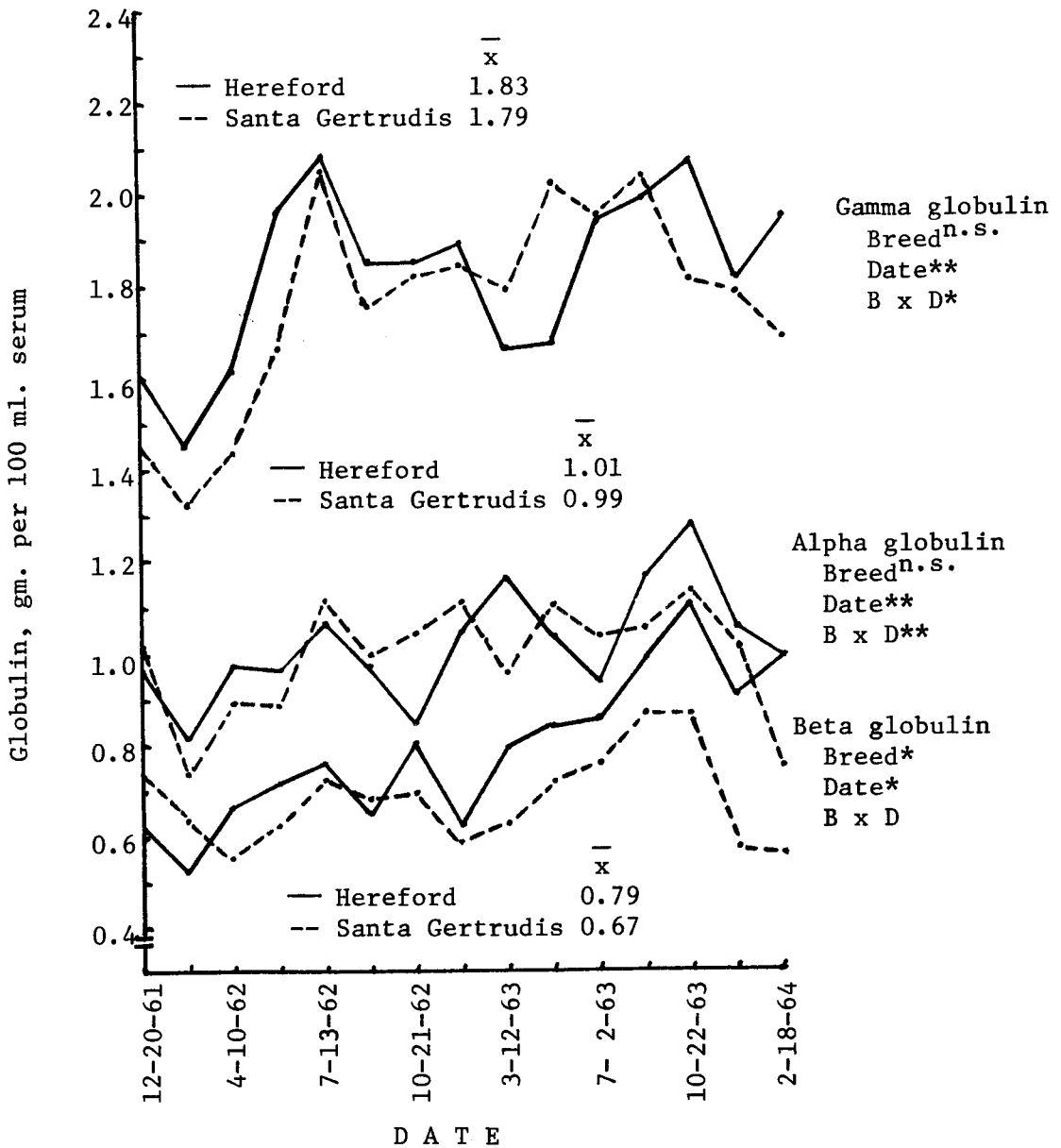
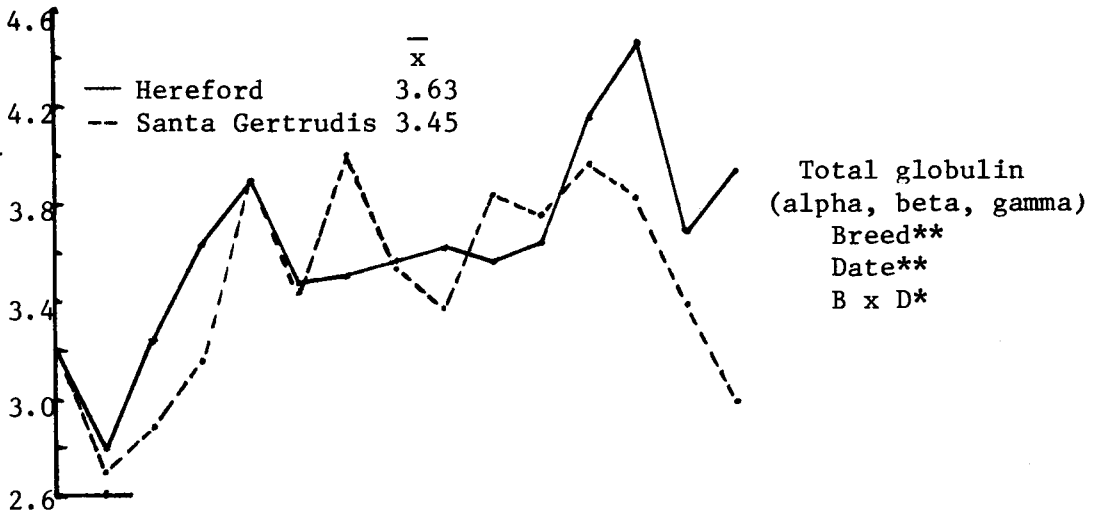


Fig. 7. Serum globulin levels in Hereford and Santa Gertrudis cows