

**Effect of some environmental factors on birth weight of  
Kenana ( Sudan Zebu ) sub-type calves at UmBanein and  
Nisheishiba Research Centres.**

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**SUMMARY**

Two thousands seven hundreds and ninety nine Kenana (K) calves were studied for birth weight at Nisheishiba and UmBanein Research Centres during the period 1966 to 1986 inclusive.

Dam parity , year x season of birth interaction and sex of calf were found to be highly significant ( $P < 0.001$ ) source of variation upon calf weight at birth, but herd location was not significant ( $P < 0.05$ ).

Mean birth weight of Kenana sub-type was found 22.48 SD 4.94 kg. First - parity dams gave the lightest calves at birth (21.45 kg) followed by the second-parity dams (22.49 kg). Male calves (23.21 kg) were found to be heavier than female calves (21.75 kg). UmBanein herd had heavier (22.53 kg) but insignificant mean birth weight than Nisheishiba (22.39 kg). Heritability of birth weight of Kenana-subtype was  $0.21 \pm 0.04$ .

## **INTRODUCTION**

Birth weight, an economical production trait, is affected by both heredity and environment (Hafez and Dyer, 1969). The effect due to heredity are both breed and within breed differences. The environmental factors, however, include the effect of dam age, maternal nutrition, litter size, placental and pelvic size and calf sex (Hafez and Dyer, 1969; Said, 1978).

The specific objectives of the study reported in this paper are to determine the effect of dam parity number, interaction of year x season of calving, sex of calf and to compare Kenana subtype at two different geographical locations as well as to estimate heritability of this economically important trait.

## **MATERIALS AND METHODS**

### *Source of data*

The two herds reported in this study were located at UmBanein and Nisheishiba Research Centres. These Centres were respectively founded in 1957 and 1958. Their objectives then, were selection and breeding towards dairy type of cattle in order to form a nucleus for the Gezira Scheme mixed farming policy for the purpose of distributing bull calves to private dairies and cattle owners all over the country (M. A. R./A. R., 1962).

The calf record used in this study consisted of calf identification number (ID) , calf date of birth, calf sex, calf birth weight (kg), calf sire ID and darn parity number. The total number of records used from the two herds were 2799 calves. UmBanein

herd consisted of 1986 calves born to 739 dams and 97 sires during 1969 to 1986. The Nisheishiba records on the other hand comprised 903 calves born to 423 dams and 16 sires during the years 1966 to 1977 inclusive. A total number of 2306 Kenana calves sired to 49 bulls having at least ten off-springs each were used from both herds to estimate heritability of birth weight.

Birth weight was taken during the first 24-hours. The course term of years were sub-classed into three-year intervals. Also three season grouping; winter (November to February), dry summer (March to June) and wet summer (July to October) was considered.

*Statistical analysis:*

Analysis of variance was carried out to investigate the effect of dam parity number, interaction of year  $\times$  season of birth, sex of calf and herd location. The mathematical model was fitted using least squares methodology (Steel and Torrie, 1980). Duncan's Multiple Range Test however, was used for mean separation. the heritability was estimated using Minimum Norm Quadratic Unbiased Estimator (MINQUE) procedure with five rounds of interactions (Kennedy, 1977). This estimation was based on half-sib correlation method (Falconer, 1981). The model used for this purpose included the above factors and a random sire of calf effect.

## RESULTS

The mean birth weight of Kenana subtype was  $22.48 \pm 4.94$  kg with a coefficient of variation (C. V.) of 22% . The results of

analysis of variance showed a highly significant effect ( $P < 0.001$ ) of the model used although the coefficient of determination was only 8% . The effect of dam parity number, year x season of birth interaction and sex of calf were all highly significant ( $P < 0.001$ ) sources of variation on calf birth weight but the herd effect was not ( $P < 0.05$ ).

Table 1 , shows the effect of dam parity number, calf sex and herd location. However, birth weight increased with dam parity number up to the fourth (23.46 kg) were-after a gradual decline occurred. Male calves (23.21 kg) were significantly ( $P < 0.001$ ) heavier than females (21.75 kg).

The heritability of birth weight of Kenana sub-type was  $0.21 \pm 0.04$  with a sire and error variances of 0.61 and 10.81, respectively.

## DISCUSSION

The average birth weight found in this study (22.48 kg) was very close to that of Alim (1964), but lighter than that given by Khalifa and Khalafalla (1979) and Saeed *et al.* (1987). Their respective values were 2/7, 24.2 and 23.2 kg. Of the other subtypes in Sudan, Kenana birth weight is very close to Western Baggara Cattle (22.7 and 22.2kg) as reported successively by Mukhtar (1961) and Osman and Rizgalla (1968) for GazalaGawazat herd. Compared to other Asiatic breeds, Kenana seems to deliver heavier calves than the Local Iraqi (21.25 to 22.34 kg) as reported by Said (1978).

**Table 1: Effect of Dam Parity, sex of calf and herd location on birth weight of Kenana sub-type at Um Banein and Nisheishiba Research Centres.**

<b>Parity Number</b>	<b>Number of calves</b>	<b>Mean Birth weight ( k g )</b>
1	86	21.40c
2	643	22.49b
3	441	23.19b
4	293	23.46a
5	221	23.21ab
6	143	22.86ab
7+	195	22.86ab
<b>Average S. E.</b>		<b>0.28***</b>
<b>Sex</b>		
Male	1403	23.21a
Female	1396	21.75b
<b>Average S. E.</b>		<b>0.13***</b>
<b>Herd</b>		
Um-Banein	1896	22.53a
Nisheishiba.	903	22.39a
<b>Average S. E.</b>		<b>0.14 N.S</b>

1. Means followed by different letters are significantly different

\*\*\*  $P < 0.001$ .

N. S. Not significant.

The increase of Kenana birth weight upto the fourth parity found in this study (Table 1) supports well the findings of Saeed *et al.* (1987). The criterion through which parity attained its effect

clustered around the continuous dam growth through her first few pregnancies, and in general birth weight is related to maternal development (Vaccaro and Dillard, 1966 and Hafez and Dyer, 1969).

The effect of herd location represents an environmental and managerial influence on birth weight. The insignificant result (Table 1) does not only suggest that management at Um-Banein and Nisheishiba is similar but also that Kenana is well adapted to the area between these two locations.

The highly significant ( $P < 0.001$ ) effect of year x season of birth interaction is attributed to the changes imposed by the ecological components. These components exert their effects on dam physiology and feed intake (Mukhtar, 1961; Saeed *et al*, 1987).

The result of sex effect found ( $P < 0.001$ ) in this study reflects the effect of sex hormones and gestation length of male calves enabling an in utero additional weight gain in their favour (Hafez and Dyer, 1969).

The heritability of birth weight found (0.21) agrees with the values in the literature (Aim, 1964; Lasely, 1978 and Saeed *et al*, 1987). The above moderate heritability value suggests that selection will be a very effective tool for moderate improving of birth weight trait.

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