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**PRODUCTION CHARACTERISTICS  
AND BODY DIMENSIONS OF THE HASSAWI  
CATTLE OF SAUDI ARABIA**

(With 5 tables)

By

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**خصائص الإنتاج ومقاييس الجسم للأبقار الحساوي  
في المملكة العربية السعودية**

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لإجراء هذه الدراسة تم فحص وتحليل سجلات قطيع الأبقار الحساوي التابع لمحطة الأبحاث والتدريب بجامعة الملك فيصل بالهفوف كما أجريت تجربة تسمين على ذكور عجول البقر الحساوي للحصول على بيانات عن الإمكانيات الكامنة لإنتاج اللحم وصفات الذبيح وقد قورنت البيانات التي تم الحصول عليها من هذه الدراسة بنتائج بحوث أجريت على أبقار مشابهة مظهرياً أو من حيث البيئة أو نظام الرعاية والتربية . هذا وقد أوضحت النتائج أن الوزن الجسماني عند الولادة والبلوغ والنضج على التوالي قد بلغ ٢٤٧,٣ ، ١٤٦,١ و ١٦,٩ كجم للذكور ، ١٧٨,٤ ، ١٢٢,٧ ، ١٤,١ كجم للإناث كما أوضحت الدراسة أن إناث الأبقار الحساوي تبلغ النضج الجنسي عند عمر ٩,٨ شهراً وتلد لأول مرة عند عمر ١٨,١ شهراً وأن الفترة ما بين ولادتين قد تمتد لحوالي ١٧,٣ شهراً . كما أوضحت تجربة التسمين أن استهلاك العجول الحساوي من الأعلاف يبلغ ٩,٨ كجم/ يوماً أغلبها من المركزات وأن الزيادة اليومية في الوزن الحي خلال فترة التسمين تبلغ ١٠٤٨ جرام وأن كفاءة تحويل العلف إلى وزن حي بلغت ٩,٦ : ١ وأن النسبة المثوية للتصافي بلغت ٥٦.

**SUMMARY**

The objective of this study is to provide baseline data on phenotypic and production characteristics of the 'endangered' desert Saudi Arabian Hassawi cattle breed. Records of a small herd of the breed conserved at King Faisal University Research Station, were manipulated to estimate Live body weights at different stages of development and reproductive

performance. In addition, a feeding trial was undertaken to generate data on feedlot performance and carcass characteristics of bull calves of the same breed. Data obtained were compared to those of dwarf stabilized crosses of 'forest' and savanna tropical cattle raised under similar husbandry conditions. The results indicated that, birth, pubertal and mature body weights averaged 16.9, 146.1 and 247.3 kg for males and 14.1, 122.7 and 178.4 kg for females respectively. The results also indicated that Hassawi heifers matured sexually at 9.8 months and calve for the first time at 18.1 months age respectively; with a calving interval of 17.3 month. Voluntary feed intake of Hassawi bull calves averaged 9.8 kg/day the bulk of which was concentrate. Body weight gain averaged 1048 g/day and feed conversion ratio observed was recorded as 9.6 : 1. Dressing out was estimated as 56.0%.

**Key words:** *Production characteristics, Body dimensions, Cattle, Saudi Arabia*

## INTRODUCTION

The origin, ecological setting, utility, production-management system, adaptive and some phenotypic characteristics of the 'endangered' indigenous Saudi Arabian Hassawi cattle were described by Mohammed (1997). However, information on the production potential of this breed is lacking. The objective of this study is to provide preliminary data on production characteristics, with focus on reproductive traits, Live body weights at different stages of development, feedlot performance, carcass characteristics and some linear body measurements. Experimental and data records employed in this study were collected from a small herd of Hassawi cattle maintained under semi - improved conditions at King Faisal Research Station, AL-Hofuf, Saudi Arabia.

## MATERIAL and METHODS

### **Herd Management:**

The ex - situ conserved Hassawi cattle herd was yarded in one large, partly shaded pen as a single group and are not classified on any herding basis for feeding. The animals were fed mainly on grass hay all year (Rhodes). Water and salt licks were available at all times. Cows were not milked and calves were allowed to suckle their dams freely to dryness. Breeding bulls were run with cows all times; they were selected from within the herd on basis of growth rates from birth to puberty. All

female calves were retained in the herd. Culling tended to be on an ad-hoc basis.

Body dimensions of mature (n = 12) Hassawi bulls were measured using a 200 cm tape. Entire bull calves at the age of 10-13 month and an average body weight of 165 Kg were used to estimate feedlot record of performance of the breed. The bulls were housed individually in separate 4x4 pens constructed under a well ventilated barn. After treatment with broad spectrum anthelmintic and acaricide drugs, the bulls were offered a two component diet consisting of Rhodes grass and a commercial fattening concentrate (ARASSO) in separate mangers. Feeds eaten and refusals were recorded daily and bulls were weighed every other week. Water and salt licks were available at all times of the trial which extended for 68 days. At the end of the feedlot trial, two of the finished bulls were slaughtered and data on carcass characteristics were recorded.

**Statistical Analysis:**

Means, standard deviations and coefficient of variations were calculated according to the methods of Snedecor and Cochran (1967).

**RESULTS and DISCUSSION**

**Linear body measurements:**

Estimates of linear body measurements made on 12 mature adult Hassawi bulls (Table 1), indicate some degree of consistency as measured by coefficients of variation. This consistency leads one to suggest the high homogeneity of the breed. The coefficient of variation for body length was the least (2.15%) and, therefore, the most precise dimension for this breed identification.

**Table 1:** Linear body measurements (Cm) and coefficients of variations (C.V) of mature male (n = 10) Hassawi cattle

Item	Mean ± SD	C.V.
Body Length (BL)	135.0 ± 2.91	2.15
Height at Wither (HW)	130 ± 3.86	2.96
Cannon bone Circumference	15.8 ± 0.56	3.54
Heart Girth (HG)	154.6 ± 7.14	4.61
HG : HW	1.18	-
BL : WH	1.04	-



Estimates of body length, height at withers (HW) and heart girth (HG) were higher than reported for many dwarf cattle breeds raised in the tropical humid and sub-humid forests of west Africa (Faulkner and Epstein, 1957; Oyenga, 1967; Tidori *et al.*, 1975; and Hall, 1991). Hassawi cattle are found to be taller and have deeper and longer bodies than Muturu, Borgu and Bouche tropical cattle breeds. The HG: WH and BL: WH ratios are close to one, suggesting that Hassawi cattle are compact animals with high beef production potential.

**Live body weights:**

Records of birth and subsequent Live body weights for male and female Hassawi cattle are summarized in Table 2. Birth, pubertal and mature body weights respectively averaged 16.9, 146.6 and 247.7 kg for males (n=19) and 14.1, 122.7 and 178.6 kg for females (n = 24). Live body weights reported for this "desert" cattle breed are higher than that reported for dwarf "Forest" cattle raised under comparable management conditions (Ferguson, 1967; Roberts and Gray 1973; ILCA, 1979 and Ahunu *et al.* 1993) and Lower than for savannah Zebu cattle (Oyenga, 1967; and Saeed *et al.*, 1987).

**Table 2:** Live body weights of male and female Hassawi cattle at different stages of development

Development stage	Live body weight, Kg (mean± SD)	
	Male	Female
Birth weight	16.9±1.09 (n=17)	14.1±1.07(n=24)
Pubertal body weight	146.19.65 (n=17)	122.7±11.22 (n=19)
Mature body weight	247. ±28.33 (n=12)	178.6±2626.95(n=22)

(n) = Number of observations

**Reproductive Performance:**

Summary of reproductive records of Hassawi heifers raised under semi-improved husbandry conditions is presented in Table (3). Heifers were considered sexually mature when exhibited cardinal signs of estrus. This occurred in Hassawi heifers at an average age of 9.8 month, while age at first calving averaged 18.1 month and ranged between 15 and 22 month. Calving interval ranged from as short as 12 month to as long as 25 month. Comparison of these data with those reported for stabilized African crosses, raised under similar conditions, revealed that Hassawi cattle matured earlier and calved at a younger age (Olutogun, 1976 and Tidori *et al.*, 1975). However, calving intervals

were longer for Hassawi cattle than Kepesti, Borgu, Samba and Muturu cattle (Twah and Mbah, 1989 and Dehoux and Hounson, 1993).

**Table 3:** Age at sexual maturity, first calving and length of calving interval (months) of Hassawi cattle raised under semi – improved management conditions

Characteristic	Mean $\pm$ SD	Range
Age at sexual maturity (n = 22)	9.8 $\pm$ 1.77	7.2 – 13.6
Age at first calving (n = 17)	18.1 $\pm$ 2.17	15.1 – 22.4
Calving interval (n = 19)	17.3 $\pm$ 3.27	12.7 – 24.8

**Feed lot Performance Record:**

The results of the feedlot performance trial are presented in Table 4. Voluntary feed intake (VDMI) of Hassawi bull calves amounted to 9.8 kg / day representing 137.3 g and 149.2 g per kg metabolic body of the initial and final body weights of the bulls. The observed rate of VDMI per Unit of metabolic body weight are definitely higher (117 g) than reported by Mustafa *et al.* (1990) for Western Sudan Baggara Zebu cattle ; indicating that the nutritional demands for growth are higher for Hassawi cattle than for Zebu breed (Montgomery and Baumgardt, 1965). Hassawi bulls, therefore, tended to select the concentrate portion of the diet (87.8% of VDMI) than the roughage portion to meet the extra nutritional demands for growth. It must be mentioned at this point that no digestive disturbances were noted on the bulls despite the relatively excessive intake of concentrate. The average rate of body weight gain and feed conversion ratio (FCR) of Hassawi bulls amounted to 1048 g/day and 9.6 : 1 respectively. These data are comparable to results obtained by EL Tayeb *et al.* (1990) and Khalifa *et al.* (1975) for Sudan Zebu cattle fattened on diets based on low quality feeds.

**Carcass characteristics:**

Weight and proportions (%) of carcass and body parts of edible and or of economic value are listed in Table 5. Dressed/eviscerated carcass weight expressed as percent of body weight at slaughter (56%) was not different from that observed by El-Shafie *et al.* (1976) for Sudan zebu cattle (55.3%); but was obviously higher than that reported by ILCA (1979) for dwarf west African cattle. However, percentages of other body organs were within ranges reported for other cattle breeds.

**Table 4:** Feedlot performance of Hassawi bull calves

Item	Mean $\pm$ SD
Initial body weight (Kg)	225.0 $\pm$ 31.6
Final finished body weight (Kg)	296.3 $\pm$ 39.1
Length of finishing period (days)	68.0
Total voluntary feed intake (Kg/day)	9.8 $\pm$ 0.36
Concentrate Voluntary intake (Kg/day)	8.6 $\pm$ 0.32
Roughage voluntary intake (Kg/day)	1.2 $\pm$ 0.04
Body weight gain (g/day)	1048 $\pm$ 175
Feed conversion ratio (FCR)	9.6 $\pm$ 1.82

**Table 5:** Carcass characteristics of slaughtered finished entire Hassawi bull – calves

Item	Mean $\pm$ SD Weight	% of body weight at slaughter
Body weight at slaughter	296.0 $\pm$ 3.16	-
Eviscerated carcass weight	165.7 $\pm$ 20.92	56.0 $\pm$ 3.56
Skin and Limbs weight	36.9 $\pm$ 2.61	12.5 $\pm$ 1.00
Empty GIT weight	18.6 $\pm$ 1.23	6.3 $\pm$ 0.20
Liver and spleen weight	4.6 $\pm$ 0.43	1.6 $\pm$ 0.13
Kidneys weight	5.1 $\pm$ 1.76	1.7 $\pm$ 0.22
Plug weight	2.4 $\pm$ 0.19	1.4 $\pm$ 0.26

## REFERENCES

- Ahumu, B.K; Arthur, P.F. Danbaro, C.R. and Aboayge, G.S. (1993): Pre – weaning growth performance of West African shorthorn cattle and their Jersey crossbreds in Ghana. *Trop. Anim. Health. prod.*, 25 : 33-40.



- Dehoux, J.P. and Hounson- ve, G. (1993):* Productive de La race bovine Borgu selon les systemes de elevage traditionnels au nord – est du Benin. *world Anim. Rev.*, 74/75: 36-48
- EL-Tayeb, A.E. Mohammed, T.A. and Mohammed H.K. (1990):* Growth performance, feed intake and Nutrients digestibility by Western Baggara cattle fed sorghum Stover with different levels of concentrates. *Sudan J. Anim. Prod.*, 3 (3): 69 – 79.
- El shafie, S.A., Osman, A.H., khalil, K.A. and Tawfik, E.S. (1976):* Prewaning and post weaning growth and its relationship to feedlot performance and carcass characteristics of bull calves. *Sudan, J. Vet. Sci. and Anim. Husb.*, 17: 1 – 16.
- Faulkner, D.E. and Epestein, H. (1975):* The indigenous cattle of the British dependent territories in Africa with material on certain other countries. *Pub. Col. Adv. Comm. Agric. Anim. Health, For, No 5.* London, U.K. HMSO.
- Ferguson, W. (1967):* Mutura cattle of Western Nigeria. *J. West Afr. Sci. Assoc.*, 12: 37-44.
- Hall, S.J.G. (1991):* Body dimensions of Nigerian cattle, sheep and goats. *J. Anim. Prod.* 53: 61– 69.
- ILCA (1979):* Trypanotolerant livestock in West and Central Africa. Vol. 2: country studies. *ILCA. Mono. No. 2.* Addis Ababa. Ethiopia, ILCA. 303 pp.
- Khalifa, H.A., Khidir, O.A. and Mohammed, T.A. (1975):* Intake of food and water requirements of growing kenana Heifers (A Northern Sudan Zebu). *Acta Veterinary (Beograd)*, 5: 261 – 267.
- Mohammed, T.A. (1997):* Phenotypic characterization of the Saudi Arabian Hassawi cattle breed. *AGRI (FAO/UNEP)*, 21: 35-42.
- Montgomery, M.J. and Baumgardt, B.R. (1965):* Regulation of feed intake in ruminants 1. Pelleted rations varying in energy concentration *J. Dairy Sci.*, 48: 569-574.
- Mustafa, A.F., Mohammed, T.A. and El-Tayeb, A.E. (1990):* Effects of feeding milled sorghum Stover in a conventional concentrate diet on performance of Western Sudden Baggara cattle. *Sudan J. Anim. Prod.*, 3 (3): 57-67.
- Oyenga, V.A. (1967):* Agriculture in Nigeria. Rome, FAO. Pp 308.
- Olutogun, S. (1976):* Reproductive performance and growth of Ndama and Keteku cattle under ranching conditions in the Guinea savanna of Nigeria. *Dept. Anim. Sci. Univ. of Ibadan, Nigeria.* 292 pp (Ph.D. Thesis).

- Roberts, C.J. and Gray, A.R. (1973):* Studies on Trypanosome Resistant cattle. 1. The breeding performance of the Ndama, Muturu and Zebu cattle maintained under the same conditions of Husbandry. *Trop. Animal Health. Prod.*, 5 : 211-219.
- Saeed, A.M., Light, D., Durkin, J.W and Wilson, R.T. (1987):* characterization of Kenana cattle at Um Banien, Sudan. ILCA Research Report No. 6. ILCA , Addis Ababa , Ethiopia , pp 46.
- Snedecor, G.W. and Cochran, W.G. (1967):* Statistical Methods. 6<sup>th</sup> edition. The Iowa state University press. Ames, Iowa , USA.
- Tidori, E., Serres, H., Richard, D. and Adjusziogul, J. (1975):* Etude el une population taurine de race Boule ' en cote d'Ivoire. *Rev. Elev. Med. Vet. Pays trop.* , 28(4): 499-511.
- Twah, C.L. and Mbah, D.A. (1989):* Cattle breed evaluation and improvement in Cameroon: A review of the situation. Ngaoundere, Institute of Animal Research. 29 pp.