Phenotypic characterization of the Saudi Arabian Hassawi cattle breed

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Summary
Hassawi cattle breed is a mix of Bos indicus and Bos taurus. The cattle are raised in the Eastern province of the country by farming families in mixed farming system. The breed numbers are declining very fast, from 10,449 head in 1986 to an estimated maximum of 4,500 head at present.

The decrease is mainly due to replacement by exotic breeds, the indiscriminate crossing with these exotics, particularly in view of the scarcity of the Hassawi bulls for mating. Animals are small in size, mature body weight 210-270 kg for bulls and 150-200 kg for cows, quite uniform in colour (light red) and body conformation have conspicuously reduced dewlap and umbilical folds and relatively large hump. Animals are heat tolerant, sustain high feed intake under ambient temperature, resistant to many diseases prevailing in the region and cows have good mothering ability. Productivity of the breed in terms of meat and milk is low when compared to that of exotics in high input production environments, but reproduction performance excels that of temperate breeds and zebu cattle.

Efforts should be made to stop the decline in the breed numbers and to conserve the breed as an asset for production under harsh environment.

Key words: Hassawi, Al-Quatif district, Ecology, Physical characteristics, Production systems

Introduction
Population size, species and breed diversity of the indigenous domestic livestock in the
Middle East and the Arabian peninsula are declining at an ever accelerating rate. Some of the 171 breeds of the domestic species existing in the region are endangered or at risk of becoming extinct. Species and breeds with low production potential are the most endangered. Indigenous cattle of the Arabian peninsula are on top of this list. The Hassawi cattle breed of Saudi Arabia is one such example.

Typical Hassawi cattle are kept in small numbers on some small-scale traditional farms in the Eastern province of the Kingdom of Saudi Arabia. The breed has neither been described in the literature nor inventoried in Masons’ World Dictionary of Livestock Breeds (Mason, 1996) or the FAO/UNEP World Watch List for Domestic Livestock Diversity (Scherf, 1995). In the absence of a systemic and coherent institutional policy to improve and conserve them, the Hassawi cattle will become extinct and, a potentially valuable genetic material will be lost forever.

The objective of this manuscript is to characterize the Hassawi breed by providing basic information on its origin, population statistics, ecology, production system, utilisation, physical and adaptive features and production characteristics.

**Origin and Population Statistics**

Present-day Saudi Arabian indigenous cattle can be classified into three categories: the humped *Bos indicus* (Zebu) distributed widely in the Southern provinces of the Kingdom along the Red Sea coast; *Bos indicus* x *Bos taurus* derivatives (Sanga), found mainly in the Central and Eastern provinces along the Arabian Gulf coast and the stabilized Zebu x Sanga types scattered in the Eastern, Western and Central provinces.

The origin of Saudi Arabian cattle dates back to around 7500 B.C. Epstein (1971) suggesting that cattle were brought into the Arabian peninsula, from their centres of domestication in the Indian sub-continent, well before their introduction into other parts of the world. According to Payne (1964, 1970), Rouse (1970) and Smith (1980), the Samitic tribes of southern Arabia were the first to introduce zebu and *Bos taurus* cattle into Eastern, Southern and Northern Africa and probably, Europe.

It is most likely that the humped Asiatic zebu and the humpless *Bos taurus* cattle types once occupied extensive areas of the peninsula, interbred with each other or evolved independently into several distinct breeds or strains. One of these breeds is the present Hassawi (synonyms: Dirbani, Baladi) as it is named in Saudi Arabia, bred by farming families in numerous villages of the Eastern province of the Kingdom.

The breed population was large and its ownership was most common prior to the 1970’s. Since then, however, the breed numbers have declined markedly. According to the Ministry of Agriculture (Year Book, 1990) the numbers of the breed decreased from 10 449 head in 1986 to 6 815 head in 1990. This leads one to extrapolate that present population size stands at about 3 500-4 500 head, making the breed a “minor”, needing watching as “endangered” or “vulnerable” (Hall and Raune, 1993).

The reasons behind the diminishing breed numbers are many and relate to environmental, socioeconomic and technical aspects. It is common knowledge that Saudi Arabia has witnessed an accelerated form of agricultural development and human population and urbanization increases during the past three decades. To meet and sustain the increased demand for fluid milk, the government of the Kingdom implemented a policy, encouraging and financing importation of exotic temperate zone dairy cattle. This placed an excessive selection pressure against indigenous cattle and promoted an irresistible tendency to abandon them in favour of exotic breeds, and or to indiscriminately crossbreed them. In remote areas, away from the development focus, inbreeding and scarcity of feed and water were, probably, the reasons behind degradation of the breed.
Figure 1. Location of the Hassawi breeding area
Ecology, Use and Production System

In the Eastern province the habitat of the Hassawi cattle is limited to the farming areas in the Al-Qatif district on the Arabian Gulf and Al-Ahsa Oasis to the southwest (Figure 1). The ecology of the habitat is arid and desert-like. Away from the coast extends an undulating poorly vegetated terrain 100-500 meters above sea level, hosting the largest crude oil reserves in the world.

The climate is characterized by extreme diurnal and seasonal variations in temperature, humidity and sunshine. The year is, however, divided into two distinct seasons:
1) a 7-month long (April-October) rainless and very hot but humid summer with 10 hrs of sunshine, and
2) a 5-month (November-March) warm and rainy winter season with 7 hours of sunshine.

Long term maximum and minimum temperatures recorded were 44.7°C and 25°C in July and 25°C and 9°C in January. Rainfall is low and amounts to 60-70 mm. Most of the precipitation is received in December and January. The distribution of cultivatable lands and water resources is very limited and localized, hence the intensity and distribution of human population and agricultural activities.

The Hassawi cattle are kept in small herds of 2-5 head by small scale farmers. The bulk of the 0.5-5.0 ha family farm is occupied with date palm trees under which high value crops such as vegetable and fodder crops are cultivated using pump irrigation from underground water basins. Occasionally citrus fruit trees are planted.

The main purpose of keeping the cattle on the farm is the provision of milk for household consumption. The milk yield of these cattle, however, is too low to warrant marketing without adverse effects on the growth and well being of the calf. The breed has reasonable conformation for meat production and yields good beef carcass. Heifer calf meat, however, is preferred by the inhabitants to bull calf meat, a habit which
may have contributed to the reduction in breed numbers. Cattle manure is extensively used for soil conditioning and fertilization. Because of their small size, the Hassawi cattle are not used for work on or off-farm.

The mixed crop-livestock production system practised, and the scarcity of grazing and labour deemed that the cattle be managed under a zero-grazing system. They are usually kept in permanent confinement with a shed and stall feeding. The majority of the herds tend to have no breeding bulls, however, and breeding is a problem. The cattle are fed green fodder (*Medicago sativa*) and purchased hay (Rhodes grass) as base diet, supplemented with underquality dates. Calves are kept in separate stalls and are allowed to suckle their mothers twice at the morning and evening milkings. Hassawi cows do not let milk down if their calves are not under them at the time of milking.

**Physical Characteristics**

The Hassawi breed is uniform and homogenous and exhibits least variations in size, conformation and colour. The breed is of medium size and has a reasonable general conformation. The small size may have resulted from natural selection under harsh environmental conditions and reduced feed availability.

The body is of fair depth, although inclined to lack width at the chest and flanks and to be flat over the ribs. The legs are long with light and fine bones, suggesting that the animals could be trekked for long distances.

The coat colour is invariably light red and has short and glossy hair and pigmented skin. The knees, fetlock, hooves, eyelids and tailswitch are either black or brown, in harmony with the muzzle colour.

The head is long and proportionately small compared to the body. The face is long, triangular and slightly concave in profile with a flat and wide forehead. The nose is straight and the muzzle is large and is either black or brown. The eyes are often surrounded with black areas and prominent supraorbital bones. The ears are large and comparable to those of Indian breeds. They are laterally located and horizontally oriented. The horns are rudimentary in females and very short in

*Figure 3. A Hassawi bull*
the following valuable attributes:

a) heat tolerance: the Hassawi cattle are hardy and adapt well to the hot and humid environment in which they live. They may have, through time, developed mechanisms giving them a high degree of heat tolerance. These mechanisms comprise dark skin pigmentation protecting against sunburns and a shiny coat capable of reflecting a high proportion of solar energy;

b) feeding behaviour: the Hassawi cattle are capable of sustaining a good appetite, unimpaired by high ambient temperature. They are capable of feeding well during seasons and hours of high temperature;

c) water and feed economy: the relatively small size, coupled with the remarkable heat tolerance of the Hassawi cattle, reduces the amounts of water and feed they require for their body maintenance and condition;

d) mothering ability and herd instinct: the Hassawi cow is an excellent mother. She is reluctant to let milk down if her calf is not under her when milked. She feeds and protects it well against potential predators. In addition, the cattle have a well developed herd instinct, a characteristic

Adaptation Characteristics

The Hassawi cattle are evidently low-producing animals, nonetheless, their owners believe that they are endowed with...
making them tractable and easy to herd. However, they are difficult to milk and to handle as individuals;
e) disease resistance: in comparison with other cattle breeds, living on the same premises, the Hassawi cattle are resilient and have a high degree of resistance to the few endemic diseases prevailing in their habitat, such as rinderpest, foot and mouth disease and femoral fever. They are also resistant to tick infestation and tickborne diseases. Mortality rates among suckling calves and mature animals are relatively low and are respectively less than 6 and 2%.

Production Characteristics

Information on the production performance of the Hassawi cattle is seriously lacking. The results included hereunder were derived from data of unreported experimental work undertaken by the Ministry of Agriculture at Al-Hofuf research station during the period 1973-1978. The research focussed on the Hassawi cattle growth performance, reproductive abilities and milk production potential. However, the research used a limited number of animals (16 head) and its results are, therefore, not as conclusive.

Birth weight of Hassawi cattle ranged from 12-14 kg for male and 9-11 kg for female calves depending on whether the calves were born to heifers or multiparous cows. Pre and post weaning rates of daily growth averaged 293 and 512 g, respectively. Live body weight of males was 178 kg at 400 days. Pubertal body weight of bull and heifer calves ranged from 130 to 160 kg and 90 to 120 kg, respectively. The respective mature body weights of bulls and cows were 210 to 270 kg and 150-200 kg.

The Hassawi females are early maturing and fertile, capable of giving a calf every year. They attain puberty at as early as 263 days of age. Age at first calving ranged between 332 to 624 days. Mean intervals between consecutive calvings was as short as 290 days and as long as 783 days.

The milk yield of the Hassawi cows is not determined. Recorded milk off-take, however, could be as little as 180 l or as large as 570 l during a lactation period ranging from 150 to 230 days. Butter fat content of the Hassawi milk ranged from 5.0 to 6.5%, higher than that of temperate dairy breeds and zebu cattle presently raised in the Kingdom.

Conclusions

To fully describe the Hassawi cattle, there is dire need for comparative quantitative data to substantiate some of the information on their physical, adaptive and special genetic attributes. The beef and dairy production potentials of the breed are relatively low and evidently the cattle could not, without improvement, compete with more productive breeds in high input production environment.

The reproductive performance of the Hassawi cattle excels that of temperate and zebu cattle. It is often characterized by early puberty, early maturity and short calving interval resulting in high fecundity rates. In addition, the breed may be considered one of the few capable of surviving under the very hot environment of maritime deserts and to produce under limited levels of feed and water resources.

Population statistics of the breed indicate that it is endangered and on the verge of extinction. There is, therefore, an urgent need that measures be taken to prevent the loss of this potentially valuable genetic material. The status of other indigenous cattle in Saudi Arabia and other Gulf States requires study.

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