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REVIEW

TRENDS IN SHEEP PRODUCTION ON RANGES OF BALUCHISTAN

Rafig, M[1]; Munir, M[2] and Sultani, M.I.[2]

ABSTRACT : Due to low and erratic rainfall, 93% of land area of Baluchistan in Pakistan, has been converted into rangeland with variable grazing potential. Low productivity of ranges during autumn, winter and early spring has led to a number of environmental, biological and socio-economic problems. During physiological stages of breeding, late gestation and early lactation, ewes have been observation to loose body weight at a variable rate of 20-30 gm/day. Malnutrition originated from low carrying capacity of rangelands, has led to poor fertility of 45-60%,20-30% abortions during late pregnancy, birth weight of 1.8-2.50 kg, 15-25% mortality and growth rate of 75-100 gm/day during preweaning, hence delayed puberty and reduced productive life span. Infestation and infections and subsequently reduced livestock production through morbidity and mortality. These hazards have exerted some limitations on socioeconomic conditions of pastoral society of the province. Share of livestock industry in gross-agricultural product (GAP) of the province has been declined from 40 to 25 percent, annually. Factors responsible for low productivity of livestock industry and subsequent changes in socio-economic conditions of pastoral society are discussed in details.

INTRODUCTION

Baluchistan is the largest province of Pakistan and constitutes more than 40% of the country's land area. The province extends as far south as lattitude 25°30'N to the Arabian sea and as far north as the border with Afghanistan in the north-east lattitude 30°00'N. In the west it shares the borders with Iran and its eastern borders are joined with NWFP in north and Punjab and Sind in south. Depending upon the altitude, rainfall, texture of soils, temperature and subsequently rangeland production, province can be divided into North-east and South-west zones. North-east zone is 38% of province's land area and comprises of Zhob, Ziarat, Loralai, Sibi, Pishin, Quetta, Kalat and some 18% of Khuzdar district. Owing to composite nature of vegetation, the zone inhabits 76% of livestock industry dominated by

1. Scientific Officer, Sheep and Wool Project, ASI, National Agricultural Research Centre, PARC, Islamabad, Pakistan.
2. Scientific Officers, Arid Zone Res. Institute, PARC, Brewery Road, Quetta, Baluchistan, Pakistan.

sheep and goats. The South-west zone shares 62% of the province land and is constituted by districts of Gwadar, Kharan, Mekran, Panjgur, Lasbella, Turbat and part of Khuzdar. Some 24% of shp and goats are founded in this zone (FAO, 1983).

Characteristics of rangeland production : Distribution of species composing the plant biomass and subsequently dry matter production (kg/ha) of various rangelands of Baluchistan is function of altitude, texture of soils, rainfall and temperature. Northern Baluchistan is considered as semi-arid. The region consists of rugged mountains and valleys, varying in elevation of 1800-2500 m. The mean rainfall/ year ranges from 250-400 mm and occurs equally between summer and winter. Winters are severely cold and characterized by - 12°C to 4°C during November to March while summers are mild. Generally, zone has got rocky hill slopes and alluvial field valleys. The hill slopes mostly comprise of bare rocks, interrupted only by accumulation of weathered rocky material in pockets or at foot of slopes. Soils of this zone, are classified as Sierozemes, Regosols and Lithosoles. As major part of the area consists of bare rocks, it is therefore of water shed value with variable grazing potential. The vegetation of this zone is grassland on lower range and mixed shrubland on higher-land with Chrysopogon and Cymbopogon being the major grass genera (GOP, 1978 ; Nasir and Ali, 1979).

Areas composing the southern zone, are elevated 1200-1800 m and receive 75-150 mm rainfall annually and mainly during winter. The zone is characterized by 10 °C to 50 °C temperature, dry but cold and is considered as true representative of arid environment. Soils are considered rocky. Some of soils of upper terraccesses of the valley, are classified as grey desert and sierozemes. In some areas, soils of alluvial form are at foot hills. They ar deep, very gravelly or stony and do not posses developmental profile. Soils in areas of khuzdar, are usually silty and belong to alluvial grade, Haplothents. Due to poor climatic conditions, vegetation is mainly composed of shrubs (GOP, 1976 ; Chaudhri and Rafig, 1966). While the land area of Baluchistan is larger (34.7 million hectares), only a very small area is under cultivation and forestry and remaining 93% is considered as rangeland, 60% (21 million ha) of which is used for grazing (GOP, 1973). About 11.7 of grazable area is classified as poor rangeland, providing 30-50 kg/ha while 3% is of good quality, producing 250-280 kg dry matter per hectare. Remaining area is either inaccessible or undergrazed (FAO, 1983). In addition to rangelands, limited cropped area is also a source of grazing, which is contributing 24% of total digestible nutrients (TDN) and 22% of digestible, stovers and orchard grazing. Still animals have been reported to be deficient 11% of dry matter, 7% of TDN and 16% of digestible protein. Major species the plant biomass are given in table1.

Production System : Low and erratic rainfall and subsequently poor grazing potential of rangelands, have led to the production system characterised by migratory movements of nomadic or transhumant or managed under household system. These migratory movements are usually based on ecological utilization of pastures and

Table 1. Species composing the plant biomass in Baluchistan .

Species	North-east zone	South-west zone
Trees	*Pistacia khinjuk, Sageratis thea and Olea ferrugines*	*Acacia spp .*
Shrubs	*Ebenus stellatus, Ephedra intermedia, Phlomus stewartii, Marrubium vulgare, Salvia cabulica, Caragana ambigua, Prunus eburnea and Astragalus hyrcanus.*	*Aretmisia maritimia, Haloxylon griffithii, Cousinia stocksii, Acantholomon longiflorum, Pulicaria crispa, Astragalus stocksii, Convolvulus leiocalycinus, Tamarix articulata, Salvadora oleoides and Pteropyrum olivieri.*
Grasses	*Cymbopogon jawarancusa, Chrysopogon ducherri, Pennisetum orientale, Saccharum ciliare and Aegilops spp.*	*Bromus tectorum, Erymopyrum spp., Poa bulbosa and Trifolium spp.*
Forbs	Onobychis, Zizyphora and Cerastium	*Lallemantia royleana*

availability of water. It has been observed that 30-40% of sheep and 50-65 goats in Baluchistan, are being managed under nomadic system which is prevalent in southern parts. Nomadic flocks are always formed by sheep, goats, camels and donkeys. Usually sheep outnumbers to goats which are used to lead the flock when on move. Under shruby rangeland conditions, goats are better than sheep for moving and are more clever for finding the best forage. Nomadie families of Baluchistan own flocks of sheep and goats varying in size of 150-500 heads (Swidler, 1972) which travel at least 150-250 km during winter to summer and then back. When ever nomads find young grasses sprouting, they settle, children are assigned the grazing of animals within the vicinity of camp. In case where the flock is of bigger size and composed of sheep, goats, cattle and camels, herdmen take the responsibility of grazing. Woman and girl care for the camp activities and milking the sheep and goats. Nomadic movements upto some years ago, included Afghan as well as local nomads. Most of these movements have been interrupted by foreign intervention in Afghanistan. At the present the survey estimated (FAO, 1983) that more than 400,000 heads of sheep and goats have crossed the border during the migration. However many of these nomads of "Powindah" are now moving into Baluchistan alongwith those belong to Afghanistan refugees, have increased the livestock population in Baluchistan by 4 million ewe equivalent. Most of the Afghan refuges and "Powindah" have stayed in central part of Baluchistan including Zhobe, Loralai, Quetta, Pishin, Chagi, Naushki and Muslim Bagh areas.

Transhumant flocks belong to the farmers who are already settled and own some agricultural land, They are mainly concentrated in northern parts of the province. The utilization of seasonal pastures by sheep and goats, forms the ecological basis of transhumant flocks. Flocks are moved to the mountains in summer to utilize the seasonal pastures and taken back to lowland pastures in areas adjoining the Punjab and Sind provinces. Transhumant flocks are usually smaller than nomadic and vary from 75-200 heads of sheep and goats. majority of the transhumant flocks live permanently on the ranges and obtain their feed requirements. Very seldom, they graze orchard or stubbles. However flocks living in the vicinity of crop producing areas, may have access to the crop residues. It has been estimated that 65% of sheep and 50% of goats in Baluchistan are managed under this system. This proportion makes the system more important for the province where production of rangelands is declining day by day.

During the last decade, changes have been observed in the system, nomadic to transhumant and could be attributed to a number of reasons. Since the Afghan problem, most of the nomadic movements between the two countries have been ceased. Morebreeders have settled in small agricultural pockets. With the installment of tube-wells, their landholdings are producing more. Therefore they have settled, reduced the rough and harsh environment through evolution and selective breeding. Due to repeated exposure to climatic stresses, disease challenges and sparse vegetation, these breeds of sheep have developed hardiness characteristics. However same evolutionary process while providing the sheep with hardness, has exerted some

negative effects on traits of economical importance such as fertility, birthweight, puberty , feed conversion ratio, fleece weight and prolificacy (Sharafeldding and Shafie ,1965) which has also been confirmed during various production potential trials on Baluchi and Harnai breeds (Rafig *et at.* 1989).

Due to lack of a well defined breeding policy (FAO, 1987), mating continues throughout the year. However due to availability of essential nutrients, maximum mating takes place during early autumn (August-October) (Acharya, 1982 ; Prasad ,1982). This is the period when rangeland productivity starts declining. Vegetation material becomes high in lignocellulose with inadeguate contents of metabolizable energy and cannot support the animals to maintain their liveweight. This period of poor productivity of ranges coincides to physiological stages of breeding, gestation and early lactation. During breeding season when optimum liveweights are required for desirable conception rate, poor production of ranges affects the ovulation and conception rate (Degen *et al,* 1987; Thomson and Bahhady, 1988). Low liveweight of ewes maintained on ranges of Quetta and Kalat districts of northern zone and whole southern areas of Baluchistan is reflected in poor conception rate of 45-60 percent which is lower than an economical one. This is due to nutritional conditions of ewes as well as rams which are rarely subjected to flushing treatment, before the start of breeding season. Malnutrition during late pregnancy becomes more critical when metabolizable energy requirements, of the developing foetus are increased (MAFF, 1975 and ARC, 1980). As 70-85 percent of foetus development takes place during the last 4-8 weeks of gestation, it is logical to expect a relationship between plane of nutrition of ewes and birthweight of lambs (Robinson, 1982).

During our production trials on Baluchi breed in Kalat region, ewes have been observed to lose body weight at a rate of 15-25 gm/day during the gestation. Before the start of last quarter of pregnancy, ewes usually had lost 30% of liveweight at mating. Continuous undernourishment has also been observed to cause pregnancy toxaemia (Reid, 1968) which is a nutritional disease related to foetal requirements for glucose and amino acids. In southern Baluchistan where ranges are dominated by *Artemisia maritimia* and *Haloxylon griffthii* (Hasnain, 1985) 20-30% abortions are recorded every year. These plant species are spring/summer active and become succulent during winter when ewes are pregnant. Dry but cold winter characterized by -12 °C to -5 °C temperature for more than 3 weeks, further complicates the situation. As reported by Young (1983), metabolic activities during severe winter, are increased. Energy generated during metabolism is liberated to the atmosphere for the maintenance of an equilibrium between external and internal temperature. The energy meant for productive functions is lost thus leading to mobilization of body reserve tissues and losses in body weight. As a result, emaciated ewes become susceptible to various infestations and infections leading to birth of premature foetuses at a rate of 10-15% which cannot survive (Rafig *et al.*,1989). Changes in liveweight of Baluchi and Harnai ewes recorded during various seasons are reflected in figure 1.

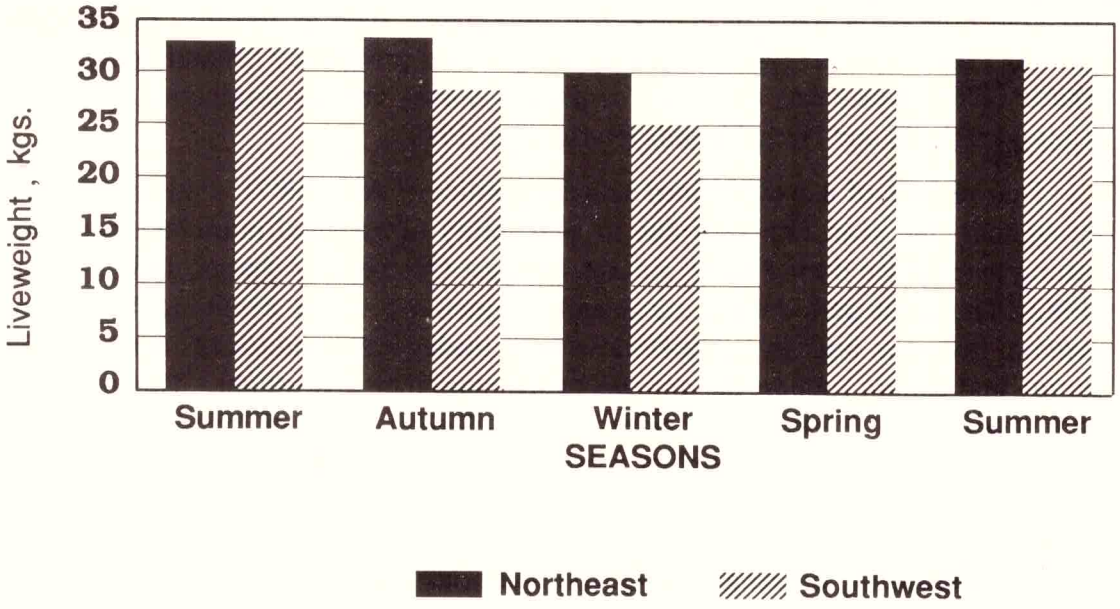

Figure1. Changes in liveweight of ewes during various seasons at pastures .

In cases where abortions do not occur, ewes deliver lambs of poor birth weight, varying 1.8 to 2.50 kg with low insultation due to smaller number of wool fibers with greater heat loss because of larger surface area/unit of body weight and a reduced ability to maintain heat production because of lower fat and energy reserves (Alexander, 1974 and Dalton *et-al,* 1980). All these factors usually lead to increase their susceptibility to environmental stress and reduce their ability to compete their normal size sibling, ultimately 15-25% mortality during preweaning. Our experiences during the last 3 years have revealed that survival rate can be increased 20-30% if ewes are properly fed during late pregnancy. Balance nutrition during late pregnancy can improve the mothering abilities and colostrum of ewes at the time of lambing (Saville, 1982). Milk production and to some extent mothering abilities of ewes are largely dependent on level of nutrition at lambing and during early lactation. Low milk production during early lactation retards the growth of lambs (Oddy, 1978). Lactating ewes are supplemented on a small scale with conventional sources, such as barley grain. In certain areas where sowing of early varieties of wheat and barley is practised, crops are either grazed or cut at vegetative stage, preserved as hay (called as khaseel) and used as a source of roughages during severe winter. Use of straw of legumes, especially pulses and fodders (guar and lucern) as a source of roughages is not uncommon. Cereal roughages harvested in vegetative stage and leguminous straws containing adequate energy and nitrogen, are helpful for animals in maintaining their liveweight during lactation.

Weaning of lambs in Baluchistan is usually carried out at an age of 120-180 days. Due to low milk yield of ewes on poor ranges, growth of lambs during the first 4-8

weeks is slow (Walkar and Hunt, 1980). Although development of rumen of the lambs is completed during first 6-8 weeks and they start grazing or taking solid food, they can not cover long distances along with their dams for grazing due to weakness and cold winter (Slee, 1978 and McCutcheon *et al.*, 1983). As creep feeding is rarely practised, preweaning weight gain varies 75-100 gm/day and weaning weight is not more than 16 kg at an age of 180 days. Poor birth weight, low milk yield and severe winter are the factors which slow down the growth rate and puberty (Bichard et-al, 1974; Younis *et al.*, 1978 and Gennty *et al.*, 1985). Milk yield of ewes milked by women once a day, usually after noon varies from 400 ml to 900 ml. Observations recorded on economical traits of sheep breeds in both zones are given in table 2.

Table 2. Production traits of sheep breeds in Baluchistan.

	North-east Zone	South-west Zone
Fertility (%)	82	55
Abortions (%)	5	18
Mortality rate (%)	5	12
Liveweight of ewes at mating (kg)	33	35
Liveweight of ewes at lambing (kg)	25	23
Liveweight of ewes at weaning (kg) of 90 days	28.4	26.1
Preweaning weight gain of ewes (gm/day)	40	33
Birth weight of lambs(kg)	2.8	2.2
Weaning (90 days) weight of lambs (kg)	11.3	8.6
Preweaning weight gain of lambs (gm/day)	98	70

Emaciated ewes and lambs when exposed to low temperature, become more susceptible to various infections and infestations. Pneumonia in sheep has been recorded as a major fatal disease during winter and contributes more than 60% in mortality. Enterotoxaemia is an other serious health hazard to the sheep industry, particularly in central parts of Baluchistan. Morbidity rate tends to be high and mortality rate sometime approaches 100% among affected lambs. Sheep pox and anthrax are other infectious diseases, contributing 15-25% losses in sheep production (Ajmal, 1982 and Fagir, 1988).

Interaction of malnutrition with heavy infestation during winter has been observed an other factor responsible for low productivity of sheep in Baluchistan. Endoparasites such as *Haemonchus spp., Ostertagia spp., Esphagostomum spp.,* Lungworm *(Dictyocaulus),* Liverfluke *(Fascioliasis)* and nasal bots are species

leading to economic losses through poor growth rate, unthriftiness, morbidity and mortality. Ectoparasites such as ticks, sheep keds, mange, mites and lices cause considerable demage to fleece and under extreme conditions, leading to debility and death (Kettle and Pearce, 1974). Infestation of high intensity caused by ectoparasites has been observed to cause sheep scabie where wool fiber start shedding from animal's body till it is naked. Although regrowth takes place during spring but chances of mortality become increased. Farmers lose on shearing crop which could have contributed 2-5% in cash income.

Wool produced in Baluchistan is usually of carpet quality. Wool produced by sheep in Baluchistan, is less medulated and less kempy, giving rise to a carpet manufacturing industry which flourishes well than other areas of the country.

Marketing System : Animal off-take from nomadic transhumant flocks is quite low. However in order to purchase basic necessities of life, nomads/transhumant sell wool, male animals, milk or milk by-products. There is no well defined marketing system. The existing marketing system is dominated by middlemen. Almost 30-40% profit goes directly or indirectly to middlemen or agents of marketing agencies (Siddiqui, 1982). Due to lack of communicational facilities in Production centres, farmers are unaware of price situation in the markets and depend on middlemen for the sale of their products (Akhtar and Pervaiz, 1987).

Socio-economic aspects of sheep production: In addition to making efficient use of marginal or waste lands, the small ruminants of the province are playing a vital socio-economic role of nomadic or transhumant communities. Small ruminants especially sheep, are widely used by landless farmers to build and store wealth until it is needed to meet any emergency (Dahl and Hjort, 1976). Reference to small ruminants as a "living bank" is often used to describe this function (Sabrani and Knipscheer, 1982 and Singh, 1982). Inspite of various hazards e.g. malnutrition, lack of health facilities, absence of credit and inadaquate marketing, sheep industry is contributing significantly in gross income of the farmer as well as the province. A study on transhumant flock comprising of ewes and does during 1974, showed that sheep are contributing more than 50% in cash income through the sale of wool, culled animals and 46% per year to cash income through household consumption of wool, mutton and milk (McDowell, 1976). Similarly a survey conducted by FAO, (1983) on a nomadic flock composed of 100 ewes and 15 does, revealed that each animal was contributing US$ 8-10 in the cash income of farmer annually. In Baluchistan small ruminants had been contributing more than 40% in gross agricultural product (GAP) but now has been declined to 25% only (FAO, 1983). In addition to the contribution in pastoral economy of the farmers, sheep of Baluchistan also sharing the national mutton, milk, wool, skins and leather production. The total mutton production shared by sheep in Baluchistan was 280000 tonnes where as milk from sheep was 44000 tonnes (GOP, 1988). Wool produced in the country 1987-88, was 572000 tonnes. The

sheep of Baluchistan also contributed in foreign exchange earned through the export of raw wool and carpets, worth of US$ 17.1 and 170.0 million, respectively. Foreign exchange earned through the export of leather and leather by-products, equivalent to US$, was 170.5 million (GOP, 1986 and 1987).

CONCLUSIONS

Surveys and research work conducted by a number of agencies on sheep in arid or semi-arid areas of Baluchistan, revealed that potential is there. Sheep production can be increased from 25-40% through reducing post-natal mortality, abortions in pregnant ewes and increasing conception rate through improved nutrition during breeding, late gestation and lactation. This is only possible when agencies focus on the:

1. Classification of rangelands according to conditions and trends,
2. Determination of grazing potential of the rangelands,
3. Studies on the grazing managements with particular reference to the ecological effects of:
   a) stocking rate,
   b) combination of animals of different grazing habits,
   c) resting periods,
4. Raising cultivated fodder crops with irrigation in arid regions for integration of grazing with supplementary feed supplies and creation of fodder banks.
5. Organization and establishment of livestock cooperatives to coordinate development and use of private and public agricultural and rangelands. This will also facilitate the marketing, supplemental feeding, credit and health cover for animls.

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