OPPORTUNITIES FOR INCREASING MEAT PRODUCTION FROM GOATS IN THE NEAR EAST REGION*

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I. INTRODUCTION

The justification for increasing meat production from goats which are reared extensively with sheep in the Near East region is associated with three principal considerations. Firstly, the demand for the meat consistently exceeds supply in many areas where there is a tradition for its consumption, and secondly, meat production is the most important function of goats in the tropics and sub-tropics (Devendra and Burns, 1983; Devendra and Owen, 1983). The third related reason for increasing productivity from goats concerns the issue of their socio-economic contribution to nomadic and transhumant pastoralists to whom the ownership of small ruminants ensures their livelihood. Given this situation, it is clearly imperative that every effort should be made to exploit all possible avenues of food production from goats in the tropics and sub-tropics including the Near East, wherein are found approximately 79% of the total world population of goats. (Devendra, 1985a)

The potential capacity of different regions to accelerate the meat producing capacity from small ruminants is therefore one of paramount importance. The Near East region represents an important area in this context (Nestel and Rendel, 1982; Bahady, 1985). There are several reasons for this which are worthy of keeping in perspective. Possibly the most important point is the fact that the region with an ecological setting of high temperature, low annual rainfall (below 400 mm), sandy soils and rangelands with rough grazing is the natural home of goats, which flourish under these conditions. Associated with the ecological setting is the time immemorial association, and a way of life, between man and his animals, which is now identified as sometimes nomadic and sometimes transhumant. In this association, animal populations (almost always sheep, goats and camels, rarely cattle) are moved seasonally over great distances in search of water and grazing. Most flocks are usually mixed, with a smaller proportion of goats, but in the more adverse desert areas such as in Saudi Arabia or the Negav desert, flocks are predominantly one of goats, which are more hardy, mostly black and coarse-haired. A third possible reason is that the goats, sheep and camels adapted to this region, are possibly the most important animals which can and are making, the best use of the resources in the difficult environment.

The intent in this paper is to briefly consider the pattern of goat production in the Near East, the factors that are likely to influence production and therefore, real opportunities for increased productivity from the species in this region.

The particular focus on goats is deliberate with full knowledge of the fact that mutton is probably the more preferred product. In doing so, the paper will also refer to the position with sheep in view of importance and complimentarily of both species in the region.

II. POPULATION AND DISTRIBUTION

Table 1 sets out the population and distribution of goats and sheep by region. It can be seen that the Near East region (Asia west of Pakistan) has a population of approximately 54 million goats and 138 million sheep, and represents about 11-12% of the total world population of each species. Sheep are obviously more numerous than goats with a ratio of about 3:1.

(Table 1 here)

An assessment of population trends during the period 1969-71 to 1983 using FAO statistics indicated that the aannual rate of growth of the goat and sheep populations were 2.0% and 0.4% respectively clearly indicating that the sheep populations were expanding about five times faster than that of goats in the Near East region (Table 1). In terms of the growth rates for both species, these were comparable (1.2-1.5%).

III. PRODUCTIVITY

Table 2 summarises the productivity of both species with respect to the main products : goat meat, milk and fresh skins with goats, and mutton, milk and greasy wool with sheep.

Consistent with the relatively lower goat population in the Near East region, the productivity was 15, 20 and 11% of goat meat, milk and fresh skins as percentage of the total world output. The corresponding figures for sheep were about 16, 47 and 13% of the total world output of mutton, milk and greasy wool respectively. Of special interest is the fact that milk production from sheep is particularly important in this region.

(Table 2 here)

Analyses of past production trends involving annual rates of change in ruminant production generally indicate that increases in meat and dairy production have been generally negligible. What increased production that has occurred has been attained largely by increasing numbers rather than by increasing productivity.

Table 3 indicates the level of production of different kinds of meat in selected countries. Within the category of red meat production, goat meat and mutton supply increased by about 5% over the 10 year period. The increased production is generally small, and is associated with a decreasing production trend in some countries. In Saudi Arabia for example, red meat production decreased (Table 4) due to limited grazing land, inadequate pasture, fodder crops and other feeds, and also because of competition of lower-priced imported meat.

(Tables 3 and 4 here)

IV. THE DEMAND FOR MEAT

There is a very high demand for both goat meat and mutton

throughout the Near East region. Consequently, there exists a potentially important expanding market for both meats. This is reflected in the share of agricultural imports for these commodities, resulting in the cost of agricultural imports increasing from 2.8% in 1970 to 6.0% in 1980.

(Table 5 here)

Table 5 indicates more particularly, that live sheep constituted the highest share in world imports from 37% in 1970 to 55% in 1980, approximating to an annual increase of about 1.8%. Over this same period the imports of red meat also increased ten fold to 10% in 1980.

The imports of both live sheep and also red meat have been achieved by exports of these mainly from Australia and New Zealand. Concerning the former, table 6 gives some indication of the extent and value of goat meat, mainly from feral goats in Australia and increasing import bills ; the region is now the largest importer of both live sheep, goats and also red meat. This trend is expected to continue and does emphasise the opportunities for examining and intensifying all avenues of increasing production from goats and sheep throughout the Near East region. It is also possible that increased meat output by more intensive production systems involving small ruminants and integrated systems is humid tropical Asia, can alleviate the demand for these meats in the Near East region (Devendra, 1985b)

(Table 6 here)

V. PRODUCTION SYSTEMS

The Near East region, possibly more than any other region, demonstrates a unique link between goat and sheep production systems appropriate to man and his association with animals, representing the resulting interaction between ecological and soci-economic factors. Climate is the over-riding dominating influence under which rearing goats, sheep and camels, rarely cattle, is not only a productive and economically beneficial activity, but also a way of life. The pattern of life and ownership of flocks of grazing goats and sheep is very significant in that these species use much of the land that is unproductive for crop production. It is more than likely that goats and sheep are presently making the most efficient use of the marginal land in the Near East region. This is especially the case in areas where the rainfall is below 200 mm, no water is available for crop cultivation and pastoral animal husbandry thus constitutes the only means of subsistence livelihood : goats and sheep in these circumstances are very valuable resources. Recently de Leeuw and Kondandreas (1982) have reported that livestock sales when expressed in terms of biomass gave annual offtakes of 16-28% which suggests good efficiency by pastoralists and the utilization of the available resources.

The two main production systems are nomadism and transhumance. Both these systems are practised by the bedouins and represnts highly rational adaptation of human life to a severe and adverse environment. It is a natural response to traditional livelihood under extreme limitations. It has

been estimated that in Afghanistan, nomadism and transhumance involve some 80% of the population. In Somalia about 70% of the population are devoted to nomadic pastoralism, contributing 60% of the gross national product and 80% of the value of national exports (Reusse, 1982). In Sudan and Syria, most of the livestock are owned by tribal nomads and transhumants for whom this is the basis of their existence (Faulkner, 1984) Nomadism and transhumance, mainly in arid, semi-arid and steppe conditions are characterised by extensive husbandry. It is therefore appropriate to briefly describe these systems.

i) Nomadism

Nomadism involves the regular movement of whole families and tribes in search of grazing and water. It is characteristic of bedouin tribes in Saudi Arabia, Syria and the Sudan. Flocks may consist of goats or sheep only, or mixtures of both species. Management practices are the outcome of centuries of adaptation to peculiar and difficult physical environment ; a limited number of crops can be grown, but goat and sheep-rearing is a principal livelihood. In the Near East poor water supply determines the traditional systems of grazing areas with sparse vegetation of mainly weeds.

During the long dry season, the goats are grazed close to water points and are watered either daily or every other day. The hamlets are separate and independent of the camel camps, and each family has

its own separate pen for the goats and the sheep. In the Rift Valley, lack of grazing rather than lack of water is the motivation for nomadism. The Turkana nomads of this region divide their stock into animals that browse (camels and goats), and animals that graze (cattle) (Gulliver, 1955). In this system camels that graze in the plains during the dry season are shifted into the mountains with the onset of rains. Cattle are confined to the mountains during the dry season and moved to the plains to take advantage of better grazing with the first rains. Flock sizes of goats and sheep are large and can vary from 100-800 heads.

Animal husbandry in nomadism and transhumance is intimately linked to the social life of the people.

Nomadic livestock management has three features :

i) Herd diversification: different species with their different grazing habits (for example, browsing by goats), reduce the probability of total loss of all animals.

ii) Loaning animals and sharing herds: this enables sharing livestock with others in another area if there is a drought. Also social contacts are strengthened.

iii) Movement of herds: this is an obvious strategy for survival and includes various types of migration: seasonal, short-distance or long-distance disaster migrations.

ii) Transhumance

Transhumance or semi-nomadism, while it is also basically a migratory system differs from nomadism in that usually it also involves some shifting arable cultivation in rain-fed areas or even sedentary systems in villages, rural-fringe areas or at oases during certain seasons of the year (Wilson and Clarke, 1975).

Several patterns of alternating sedentary crop cultivation with migration to grazing areas exist in different parts of the world, mainly in semi-arid areas or areas with extended dry periods:

- alternation between winter quarters in the plains and valleys and summer mountain grazing areas; there may be an overlap between transhumant and nomadic people, the latter entering grazing grounds which are left by transhumants for summer grazing;
- winter grazing in desert areas, summer grazing in oases and irrigated cropping areas;
- grazing in plains and valleys which are left during the rainy season when they are flooded and sometimes cannot be used because of diseases risks (tse-tse, parasites).

These movements sometimes follow fixed annual routes. Sometimes the extent of movements from the cropping area is varied according to available feed.

Usually the grazing areas are public land and not individual property but between tribes and families

there are traditional rights for grazing and use of watering points. However, because of increasing pressure on ranges from extending crop forest protection areas, these rights are less and less observed and range management is deteriorating. The resulting damage is often attributed to goats.

During the cropping season goats and other stock are herded by children or left to fend for themselves. Sometimes they are entrusted to hired shepherds. The flock sizes are smaller and about 100-300 animals.

iii) Village Systems

There is a third management system which is found in the higher rainfall areas (above 400 mm). In this system goats and sheep are reared in the vicinity of villages, are exposed to communal grazing grounds and whatever crop residues and waste feed of no value to human consumption. The flock sizes are small and about 6-10 animals.

VI. GOAT MEAT

Three types of goat meat are produced (Devendra, 1981), as follows:

- Meat from Riels ("cabrito", 8-12 weeks of age)
- Meat from young goats (1-2 years of age)
- Meat from old goats (2-6 years of age)

Of these categories, the first is probably the least importance in the Near East region, but very popular in Latin America and the West Indies. The second, and especially the third are the more relevant when goats are slaughtered between 18-30 kg live weight.

The quantitative and qualitative aspects of meat production from goats has recently been received (Devendra and Burns, 1983), but aspects of carcass yield, carcass composition, grading, total adible and saleable proportions are worthy of brief discussion.

i) Carcass Yield

In young, castrated male Criollo kids, slaughtered at 8 kg live weight, dressing-out percentages (D%) of 47.7 (based on live weight) or 51.52 (based on empty body weight) were obtained (Owen, Arias Cereceres and Garcia Macias, 1982). One would normally expect milk-fed kids, especially those from high-yielding females, to have a fairly high dressing-out percentage as reported by Simiane and Miossec (1977) and Fehr, Sauvant and dumont (1977). The latter report the D% at around 52-54%. The D% for some young kids has been reported to be as high as 62% (Bergmann, 1940; Schwarzendahl, 1940). Generally, physiological age has an effect on D%. Ueckermann (1969) showed that heavier goats (31.8 kg) were 2.4% heavier depending on the nutritional plane. Data obtained from Malawi

and Botswana goats agreed with this, but not that obtained from Criollo goats. A high nutritional plane usually produces a higher D%. This was demonstrated by Gaili, Ghanem and Mukhtar (1972) with Sudan Desert goats and by Devendra (1966) on Katjang goats. For male goats, a D% of around 45-50% (based on live weight) seems to be common (Prabhakaran et al., 1979; Eker and Tuncel, 1975; Miller, Jones and Burt, 1943), although figures as high as 56.4% have been obtained for Damascus goats raised on a high nutritional plane (Louca, Economides and Hancock, 1977). Figures as low as 36.94% have been obtained for Criollo goats grown on a low nutritional plane (See Table 7).

Sex and castration exert a considerable effect on D% (Srivastava, Raizada and Kulkarni, 1968), who found that this was lower in female Jamnapari goats than in males of similar weight. This seems to be generally true as in the case of New Zealand feral goats (Kirton, 1970) and Criollos, Nubian and Criollo X Nubian goats (Acosta, 1979) when males and females of similar live weight have been compared.

(Table 7 here)

D% in Jamnapari goats was highest in females of 10-15 kg live weight and in males of 25-30 kg live weight (Pant et al., 1974). Eggen et al., (1973) reported a mean D% of 30.3 in Angora does of various

ages with a mean live weight of 30.7 kg.

Castration generally has an effect on D% in meat animals and the time at which this is carried out is important. Early castration (7 days) in Damascus goats produced fatter carcasses with a higher D% (56.4) than in entire males (55.7), whereas late castration (7.5 months) at 44 kg live weight was not successful and produced a lower D% of 54.9 (Louca, Economides and Hancock, 1977). Similarly, in Barbari goats castrated at six months, there was not much difference between these (49.93%) and entire bucks (49.81%) as reported by Srivastava, Raizada and Kulkarni (1968). Reports generally give castrates a 2.4% higher dressing out than males (Acosta, 1979) although there are accounts of a higher D% being found in intact males when these were intensively fatened (Nitter, 1975).

An important point is that D% is usually quoted on the basis of live weight. It is more accurate to quote this on the basis of empty body weight in order to eliminate the variation caused by the contents of the alimentary tract. These exert a considerable effect of D% and form as much as 29% of the live weight, (Owen et al., 1977). This makes meaningful comparisons difficult. Where possible, the data presented in Table 7 are given in both forms.

ii) Carcass Composition

Apart from actual body size or weight, the two factors which most influence the value of a carcass are the amount and distribution of the lean and fat tissues. This in turn has been shown to be a function of body weight within a particular breed and sex (Tulloh, 1963). This was found to be true in the case of male castrate Botswana goats slaughtered at various ages (Owen et al., 1978). The same study indicated that there was no significant difference between the lean and bone content of the carcasses of castrates and those of entire male Botswana goats and also entire male Boer goats of equal weight. There was, however, a difference in fat content but of a low order of significance ($P < 0.05$).

Allometric growth equations were applied by Tulloh (1963) to the relationship between the differential growth rates of the carcass tissues and body weight of sheep, cattle and pigs. As the body weight increases, the rate of bone growth decreases and the rate of lean tissue growth remains the same as, or slightly greater than, the increase in body weight. The fat tissue, however, has a greater differential growth rate. This was shown in male castrate Botswana goats where the growth coefficients in kg of lean, bone and fat are 1.1697, 0.7756 and 1.9947 respectively. The study indicated that such

goats are relatively late in maturing, the fat tissue developing very late and not reaching appreciable levels until body weights of 40 kg and more are achieved (owen et al., 1978). Studies on castrate male Criollo carcasses supported this in that carcass fat up to 24 kg live weight hardly developed and had a low differential growth coefficient of 0.9486 in relation to empty body weight (Owen, Arias Cereceres and Garcia Macias, 1982). The mature body weight of these goats was probably over 50 kg. As in other species, castration of males at an early age increases the fat composition of the cajcass (Louca, Economides and Hancock, 1977).

In general, the lean carcass composition of goats approximates around 60%, although relatively high values of 66% have been recorded for indigenous entire male Malawi goats of 29.3 kg live weight (Owen, 1975) and 68.0% for entire Alpine males of 34 kg (Fehr et al., 1976). Exceptionally low values of 53.9% were reported in male and female Philippine goats (Arganosa, Ibarra and Malabanan, 1977).

Levels of fat in the carcass of all breeds and varieties are low in comparison with pigs, sheep and cattle. The highest levels generally encountered appear to be in the region of 14%. Although very high levels of 25.4% have been recorded in Katjang goats of 25.18 kg live weight (Devendra, 1966). This

tissue is highly variable in comparison to lean and bone and is greatly influenced by such factors as the age, sex, body weight and growth rate (Owen et al., 1978).

It is of interest to note that a minimum level of fat is necessary to give a high lean : bone ratio and a carcass quality according to Western standards. Tayler (1963) stated that this should be between 18 and 20%.

In regard to lean distribution, the pelvic limb is consistently reported to have the highest lean content in relation to other carcass joints. The content of lean was reported to be highest in the pelvic limb and the shoulder, and the lowest in the thorax and the neck of Botswana castrates and entire male goats of 24.53 kg live weight (Owen et al., 1978) and also in the entire male Philippine goats of 18.87 kg (Arganosa, Ibarra and Malabanan, 1977). Devendra (1966) reported that the lean content was highest in the pelvic limb and shoulder joints and lowest in the loin and flank of Katjang goats of 25.18 kg live weight. In East African goats between 7.27 kg and 13.6 kg, the lean content was highest in the pelvic limb and thorax and lowest in the foreleg (Wilson, 1958).

The quantity of lean meat in the carcass has been found to be strongly related to the transverse

surface area of the Longissimus dorsi muscle, usually cut between the 12th and 13th ribs in sheep and goats. Singh Sengar (1970) indicated that this was true in male Barbari and Jamnapari goats. In goats of various breed types of approximately 20 kg slaughter weight, the area of the Longissimus dorsi muscle varied from 4.12 to 16.12 cm^2.

(Table 8 here)

In regard to fat distribution, the level of subcutaneous fat is usually extremely low in goats. In Alpine, Toggenburg, Saanen and Nubian goats, the back fat depth range was 0.3 mm with an average of 1.07 mm in animals of live weight 21.5-55.4 kg (Ladipo, 1973). In the same study, where higher levels of carcass fat are reported, the intermuscular site had the highest deposit at 39.7% of the total fat as opposed to 14% in the case of the subcutaneous fat. In young East African goats between 7.27 and 13.64 kg live weight, the reverse was true (Wilson, 1958), most of the fat in newly born kids being found in the abdominal cavity. As the kid grew, the pattern of distribution changed and more fat was found in the carcass as intermuscular and subcutaneous deposits. In general more carcass fat that can be dissected is found in the trunk than in the limb of the various goat breeds (Owen et al., 1977, Ladipo, 1973).

In comparison between goats and sheep, Gatan (1941) and Ladipo (1973) found more visceral fat in goats than in sheep but the opposite was found in Botswana goats and sheep by Owen et al., (1977, 1978). Many authors agree, however, that goats deposit less subcutaneous fat and less intermuscular fat than sheep (Ueckermann, 1969: Owen et al., 1977, 1978 ; Ladipo, 1973).

iii) Grading of Goat Carcasses

Because of the apparent similarity between sheep and goats, several workers have been tempted to apply sheep grading schemes to goat carcasses. In most carcass grading systems (USDA and UK), the quantity and distribution of fat, particularly subcutaneous fat, are very important in the grading of sheep carcasses. It has been found, however, that goat carcasses have far less fat than sheep carcasses and too limited a range of the tissue to allow its use in grading.

Fat did not vary enough between Angora goats or Criollo goats of similar age to facilitate its use in grading (Smith, Carpenter and Shelton, 1978). Pike et al., (1973) in a separate study also suggested that the use of fat as a quality indicator, as employed by USDA for lamb carcasses, may not be applicable to goat carcasses.

Ladipo (1973), after attempting to apply USDA grading parameters to goats, stated that because the preferential deposition of carcass tissues differs in goats from that in lambs, standards that will more accurately reflect the actual value of the goat carcasses were needed. Joubert (1973) reports that goat carcasses were graded in South Africa but, according to Ueckermann (1969), even the carcasses of improved Boer goats, slaughtered at 31.8 kg live weight, had their carcasses downgraded in that country due to insufficient carcass fat. It would seem, therefore, that in this case sheep standards were once again being applied. A grading scheme specially developed for export goat carcasses, based on age, conformation and finish, has been used by the Botswana Meat Commission (Joubert, 1973). In Monterrey, northeast Mexico, kid carcasses (or cabrito) are sold at varying prices according to the quantity of abdominal fat (renal and perinephric) they contain. The carcasses with the most fat are usually those in most demand. Kidney fat in young milk-fed kids is one fat depost which exists in sufficient quantity to enable it to be used in grading schemes for this type of carcass (Owen, personal communication). In the German Democratic Republic, official grade standards for goats, based on age, carcass weight, meatiness and fat cover have been laid down (German Democratic Republic Official Standard

1976) but such grading standards for goats are rare.

iv) Total Edible and Saleable Percentages

The total edible and commercially valuable portions of the carcass are important aspects of economic goat production. In fact, they represent important indices of their value in any particular locality. The total edible portions include the offals which are valuable for two reasons. One is that they are extensively consumed in varying ways. The other is that the value of the offals offsets the cost of slaughter. In Southeast Asia for example, the value is much higher than in other regions. Table 9 summarises the available information in these estimates in different locations.

(Table 9 here)

VII. INCREASING MEAT PRODUCTION FROM GOATS

The present levels of production in respect of meat and milk production are not well documented in goats. Productivity is constrained by a number of limiting factors, notably poor breeding and selection of existing breeds, generally poor standards of management, inadequate marketing facilities and systems. Consequently, flock offtakes are poor and variable, implying there exist considerable opportunities for improving potential production from goats.

Using available data based on a review of the literature (Devendra and Burns, 1983), Table 10 summarises current production levels of goats in the Near East region.

(Table 10 here)

These figures are average and emphasise that with improved and more intensive systems of management, it is feasible to substantially improve the level of performance of goats in the Near East region. There are a number of factors associated with this objective.

1) Improved Utilisation of Breeds

The Near East region has fewer breeds of indigenous goats than the African or South East Asian region all of which have not been improved by intensive selection. They include the Syrian type, which has been classified by Mason (1969) as the Baladi in Egypt and Jordan; Iraq in Iraq, Anatolian Black in Turkey; the Moroccan goat; Hejaz goats, which are synonymous with the Black Bedouin goats; Sudanese Nubian and Desert goats and the Benadir breed of southern Somalia. On the other hand, evolution of the Damascus breed, based on intensive selection and breeding (Constantinou, 1981) represents one outstanding example of what can be achieved.

Although many of these breeds have been identified, very limited attention has been directed at describing

and selection and concurrently assess potential production capacity. Probably because of these reasons, the majority of the goat breeds have continued to record generally low levels of productivity in relation to the limited resources available to them.

2) Production Objectives

Clear production objectives are essential and are important for two reasons. One is that it ensures maximising product output, while the other is that this enables the production objectives to be related to market demand and market outlets.

Characteristics of the Products

(i) Meat (goat meat and mutton)

Quantity - Total amount of lean meat in the carcass (measured by live weight before slaughter).
Growth rate, in the case of lambs, is related to efficiency of production.
Total number of animals available for slaughter; this is likely to be more important than amount of meat in each animal. Total weight of off-spring meaned/year/female is important.

Quality - Quantity and distribution of fat (excess undesirable).

(ii) Milk

Quantity - Total yield, lactation length,

persistency and number of lactations.

Quality - Milk composition (butter fat and solids non-fat).

3) Reproductive Efficiency

There is no doubt that improvements to reproductive efficiency can significantly contribute towards increasing numbers born and the output of products. Reproductive rate is the all to important factor and the build up of numbers is associated with the following components:

(i) Age at first mating (females)

(ii) Productive life span of males and females

(iii) Annual mortality in the breeding flock

(iv) Number of young females reared per 100 breeding females. This is influenced in turn by :

a) Per cent of breeding females failing to bear

b) Per cent of breeding females producing multiple births

c) Frequency of parturition, and

d) Mortality rate up to first mating

Increasing fertility or number of offsprings born per female per kidding or lambing is important because this influence significantly the margin of profits. Lifetime productivity is essential and thus must be retained in the flocks long enough (5-7 years age) in order that they express their genetic capacity.

4) Effective Use of the Feed Resources and Feed Efficiency

Effective use of the available feed resources (forages, agro-industrial by-products and non-conventional feed resources) by goats is a definite means of increasing performance per animal and output per unit area of land. These are not being used effectively presently and contribute to the poor levels of performance in the animals. In many situations dietary protein rather than energy is the main limiting factor. Thus supplemental proteins go a long way to meet the requirements as well as promoting high animal performance. Good quality protein sources are expensive, and there is need to use alternative cheaper protein sources.

Possibly the most important objective is the need for more forages and the like to increase dry matter production. It is estimated that in the Near East about 40 million ha could be used for rain fed fodder production by the use of forage legumes in the traditional wheat/fallow rotation. In this context the outstanding successful development in Syria, of the ancient and traditional system of grazing control, the hema, merits special mention. It includes *inter alia* introducing *Atriplex spp.*, planting fodder trees and creating lamb fattening cooperatives. By comparison, in the drought prone areas in western India, the introduction of *Cenchrus ciliaris* and *Lasiurus sindicus*

increased D M yield from 0.4 t to 3 t/ha/annum (Jain, 1983).

The system ensures that the members agree to a maximum holding of 100-125 sheep for family, according to the carrying capacity of the area allocated to the cooperative. This has resulted in reducing pressure on the ranges, concurrent with the development of feed facilities and most important, increased offtakes from the land and socio-economic benefits. The animals purchased for fattening are usually young males between 6-16 months age, weighing 25-40 kg live weight, given 1.5 kg of feed per animal per day, and finally sold for a profit at about 53-60 kg live weight. Up to 1981, it has been reported that the number of cooperatives has increasedto 55 having 4371 members and involved 1.5 million sheep annually. In Syria, this has involved two million sheep annually (Draz, 1983).

It is potentially possible, using the Syrian example, to increase the feed resource base elsewhere in the Near East, to increase the performance of goats as well as increase the throughput of animals.

5) Improved Health

The wastage due to disease represents a source of major economic loss in goats especially up to weaning. It is particularly high in densely populated areas

where veterinary and diagnostic services are weak.

Losses due to goats are of three categories :

(a) Lowered resistance, caused by undernutrition and malnutrition resulting in deaths due to various diseases.

(b) Parasitism due mainly to roundwork infestation is a major cause of loss throughout the tropics and is associated with poor nutrition and reduced resistance.

(c) Transmissable diseases such as coccidiosis and caseous lymphadenitis and pneumonia area serious, cause high mortality and necessitate disease monitoring, appropriate prophylactic measure and/or vaccination.

In Iran for example, economic losses due resulting from comdemnation of goats and sheep at slaughter due to the presence of abscesses in various organs is considerable (Tadayon, Cheema and Muhammed, 1980).

VIII. CONCLUSIONS

The Near East region is an extreme and complex ecology of harsh environment conditions in mainly arid and semi-arid conditions. In this situation, human and large ruminant populations (sheep, goats and camels, rarely cattle) have developed a pattern of living where the pastoralists execute,

successfully, logical risk-averting strategies for these animals. This association is a dynamic one and there exists several constraints to higher production. The current situation is that the output of meat is inadequate to meet the demand, and there exists therefore considerable opportunities, by appropriate interventions to increase offtakes.

With special reference to goat meat which follows mutton as the meat of choice in most parts of the Near East, there exist considerable potential for increasing production by better utilisation of the breeds, improved nutrition, management and health. While goat meat is primary production objective, milk production also needs to be encouraged. Control of numbers is essential to limit the damaging effects of over-grazing to conserve the environment. Stratification of land use has been suggested, where the more arid areas can be used as breeding zones and the less arid for raising younger stock (Nestel and Rendel, 1982). The fact remains that both goats and sheep, which are the dominant stock in the Near East (accounting for about 43% of all the meat produced) have a continuing important role in the future, with an annual projected rate of growth in meat production of about 2% up to the year 2000 (Harabovzky, 1981). If these targets are to be achieved, the utilisation of the total production resources must ensure that these are used fully and completely.

SUMMARY

The opportunities for increasing meat production from goats is examined with special reference to the Near East region. The justification for increasing this production is associated with such factors inter alia relatively high goat and sheep populations of about 54 and 138 millions respectively, a high market demand, relatively lower present production from goats, longstanding tradition of rearing small ruminants by nomadic and transhumant pastoralists and potential possibilities of increasing current contribution in the future. The high demand for meat is reflected in the increased imports in the number and cost of live sheep for slaughter to 1.8%/yr. The main production systems are nomadism, transhumance and village. Aspects of goat meat production are reviewed with reference to carcass yield, carcass composition, grading, total edible and saleable percentages. Increasing meat production from goats in the Near East region can result from improved utilisation of breeds, production objectives (meat and/or milk), reproductive efficiency, effective use of the feed resources and feed efficiency and improved health. These factors need to be aligned to stratification and improved land used by small ruminants between the more arid and less arid areas. These strategies together are essential if the projected meat production potential of 2% is to be realised up the year 2000.

REFERENCES

ACOSTA, I.H. (1979). Peso vivo, peso en canal y rendimiento en canal de ovinos y caprinos sacrificados en el frigorifico industrial bolivar, C.A. del Estado Zulia. Trabajo presentado para optar por el ascenso de Profesor Agregado a Profesor Asociado, Universidad de Zulia, Maracaibo, Venezuela.

ARGANOSA, F.C., IBARRA. P.I. and MALABANAN, M.M. (1977). Live measurements and carcase yields of native goats. Philipp. Agric., 61: 166-175

BAHADY, F. (1985). The potential for increasing small ruminant production in the Near East. F.A.O. Expert Consultation on Small Ruminants, 8-12 July 1985, Sofia, Bulgaria (Mimeograph, 25 pp).

BERGMANN, H. (1940). Slaughter yield in goats. Arch. Kleintierz., 1: 225-234.

CONSTANTINOU, A. (1981). Damascus goats in Cyprus. Wrld. Anim. Rev. (F.A.O.), 40: 2-16.

DE LEEUW, P.M. and KONANDREAS, P.A. (1982). The use of an integer and stochastic model to estimate the productivity of four pastoral production systems in West Africa. Proc. Nat. Beef Conf., Kaduna, Nigeria

DEVENDRA, C. (1966). Studies in the nutrition of the indigenous goat of Malaya. 1. The body measurements, composition of sample joints and their relationship to carcase compostion . Malays. agric. J., 45: 345-369.

DEVENDRA, C. (1980). The potential of sheep and goats in the less developed countries. J. Anim. Sci.,51: 461-473.

DEVENDRA, C. (1981). Meat production from goats in developing countries. Occ. Publ., Brit. Soc. Anim. Prod., 4: 395-406.

DEVENDRA, C. (1985a). Food production from goats. Proc. XIII Int. Nutr. Congr., 13-23 Aug. 1985, Brighton, England (In press).

DEVENDRA, C. (1985b). Prospects for developing small ruminant production in humid tropical Asia. F.A.O. Expert Consultation on Small Ruminants, 8-12 July 1985, Sofia, Bulgaria (Mimeograph, 31 pp).

DEVENDRA, C. and BURNS M. (1983). Goat Production in the Tropics (Revised). Commonwealth Agricultural Bureau., England., viii + 183 pp.

DEVENDRA, C. and OWEN, J.E. (1983). Quantitative and qualitative aspects of meat production from goats. Wrld. Anim Rev (F.A.O., 47: 19-29.

DRAZ, O. (1983). The Syrian Arab Republic - Rangeland conservation and development. Wrld. Anim. Rev. (F.A.O.), 47: 17-22.

EGGEN, N.R., SMITH, G.C., CARPENTER, Z.L., BERRY, B.W. and SHELTON, M. (1973). Composition of Angora goat carcases. J. Anim. Sci. 37: 260 (Abstr).

EKER, M. and TUNCEL, M. (1975). Goat meat production in Turkey. 26th Annual Meeting European Ass. Anim. Prod., Commission on Sheep and Goat Production, Warsaw, Poland, June 1975.

F.A.O. (1981). Production Yearbook. Vol.35, F.A.O. Rome, v + 306 pp.

F.A.O. (1983). Production Yearbook. Vol. 37, F.A.O., Rome, v + 320pp.

FAULKNER, D.E., (1984). Middle East and Pakistan. In Development of Animal Production Systems (Ed: B.S. Nestel), Elsevier Publications, Vol. A2, vii + 435 pp.

FEHR, P.M., SAUVANT, D., DELAGE, J., DUMONT, B.L. and ROY, G (1976). Effect of feeding methods and age of slaughter of growth performance and carcase characteristics of entire young male goats. Livestock Prod. Sci., 3: 183-194.

GALAL, E.S.E. (1976). Body composition of male desert goats. Wrld Rev. Anim. Prod., 12: 83-87.

GERMAN DEMOCRATIC REPUBLIC, (1976). Ministerium fur Land, Forst und Nahrungsguterwirtschaft, Standard TGL 11652/02.

GHANEKAR, V.M., BHATAWADEKAR and SOMAN, V., (1973). Effect of age on the weight of the carcase and its different cuts in male kids of Angora cross. Indian J. Anim. Sci., 43: 133-135.

GULLIVER, P.H. (1955). "The Family Herds", Routledge and Keagen Paul Ltd., London, 271 pp.

HRABOVSZKY, J.P. (1981). Livestock development : toward 2000 - with special reference to developing countries. Wrld. Anim. Rev., (F.A.O.), 41: 2-16.

JAIN, H.K. (1983). Techno-economic analysis for rangeland development in the arid regions of Western Asia. Proc. XIV Int. Grassld. Congr., p 440.

JOUBERT, D.M. (1973). Goats in the animal agriculture of Southern Africa. Z. Tierzucht ZuchtBiol., 90: 245-262.

KIRTON, A.H. (1970). Body composition of male goats and characterization of their depot fats. Ithaca, Cornell University. (Ph D thesis).

LADIPO, J.K. (1973). Body composition of male goats and characterization of their fat depots. Ithaca, Cornell University. (Ph.D. thesis)

LOUCA, A., ECONOMIDES, S. and HANCOCK, J. (1977). Effect of castration on growth rate feed conversion efficiency and carcase quality in Damascus goats. Anim. Prod., 24: 387-391.

MASON, I.L. (1969). A World Dictionary of Livestock Breeds, Types and Varieties, Commonwealth Agricultural Bureaux, Farnham Royal, Bucks, England.

MILLER, J.C., JONES, J.M. and BURT. C.R. (1943). Feedlot and carcase studies on Angora wethers. Texas Agr. Exp. Station Bull., 631.

NESTEL, B. and RENDEL J. (1982). The role of livestock in development. In State of Food and Agriculture, F.A.O. : Rome p. 79-141.

NITTER, G. (1975). Preliminary results with intensive fattening of young goats. Kleinvieh Zuchter, 23: 316-320.

OWEN, J.E. (1975). The meat producing characteristics of the indigenous Malawi goat. Trop. Sci., 17: 123-138.

OWEN, J.E., NORMAN, G.A., FISHER, I.L. and FROST, R.A. (1977). Studies on the meat production characteristics of Botswana goats and sheep. 2. General body composition, carcase measurements and joint composition. Meat Sci., 1: 283-306.

OWEN, J.E., NORMAN, G.A., PHILBROOKS, C.A. and JONES, N.D. (1978). Studies on the meat production characteristics of Botswana goats and sheep. 3. Carcase tissue composition and distribution. Meat Sci., 2: 59-74.

OWEN, J.E., ARIAS CERECERES, M.T. and GARCIA MACIAS, J.A. (1982). The effect of body weight on carcase development of Criollo goats in northern Mexico. 3rd Int. Conf. on Goat Production and Diseases Tucson, Arizona, January 1982. (Abstr)

PANT, G.B., SAXENA, V.S., MISRA, D.S., SETHI, M.S. and SINGH S.(1974). Effect of age, sex, season and liveweight on dressing percentage of goats. J. Food Sci. Tech., 11: 290-292.

PRABHAKARAN, P., SOMAN, M., PAISMANABHA, R. & TYER, R. (1979). A note on the carcase characteristics of castrated crossbred goats. Indian J. Anim. Sci., 49: 325-326

REUSSE, E. (1982). Somalia's nomadic livestock economy - its response to profitable export opportunity. Wrld. Anim. Rev. (F.A.O.), 43: 2-11.

SCHWARZENDAHI, A. (1940). The importance of German goat keeping as a source of meat supply with special reference to slaughter investigations. Z. Tierzucht. ZuchtBiol., 54: 86 (Abstr).

SIMIANE, M. DE & MIOSSEC, H. (1977). Fattening prime kids with an automatic milk feeder. Ann. Zootech, 26: 273-293.

SINGH, S.N. & SENEGAR, O.P. (1970). Investigation on milk and meat potentialities of Indian goats. Dept. Anim. Husbandry and Dairying Tech. Rep. R.B.S. College, Bichpuri, Agra, India.

SRIVASTAVA, V.K., RAIZADA, B.C., & KULKARNI, V.A. (1968). Carcase quality of Barbari and Jamnapari type goats. Indian vet. J., 45 : 219-225.

TADAYON, R.A., CHEEMA, A.H. AND MUHAMMED, I.A. (1980). Micro-organisms associated with abscesses of sheep and goats in the South of Iran. Am. J. Vet. Res., 41: 798-802

TAYLER, J.C. (1963). Proc. Brit. Soc. Anim. Prod. London, 27 March 1963. Cited from Beef carcase appraisal by jointing. By G.C. Everitt. 1963. Symp. Carcase Composition and Appraisal of Meat Animals, CSIRO, Section 16:1, Melbourne, Australia.

TULLOH, N.M. (1963). The carcase composition of sheep, cattle and pigs as functions of body weight. Symp. Carcase Compostion and Appraisal of Meat Animals, Section 5:1 Melbourne Australia CSIRO

UECKERMANN, L. (1969). Produksie studies met Boer bokke. In Utilization of the Boer goat for intensive animal production. Anim. Dairy Sci. Res. Inst., Trene, S. Africa. (M.Sc. thesis).

WILSON, P.N. (1958). The effect of plane of nutrition on the growth and development of the East African dwarf goat. 2. Age changes in the carcase composition of female kids. J. Agric. Sci., 51: 4-21.

WILSON, R.T. and CLARKE, S.E. (1975). Studies on the livestock of Southern Sudan. I. The ecology and livestock resources of the area. Trop. Anim. Hlth. Prod., 7: 165-187.

TABLE 1

Population and Distribution of Goats and Sheep by Region

(FAO, 1983)

Region	GOATS (10^6)	(%)	Rate of growth (1969-71 to 1983) (%)	SHEEP (10^6)	(%)	Rate of growth (1969-71 to 1983) (%)	Ratio Goats: Sheep
Africa	156.8	33	1.2	190.3	17	1.3	1 : 1.2
N.C. America	14.2	3	- ve	20.5	2	- ve	1 : 1.4
S. America	19.6	4	3.6	105.2	9	- ve	1 : 5.4
Asia West of Pakistan	53.5	11	0.4	137.5	12	2.0	1 : 2.6
Asia East of Pakistan	212.8	45	- ve	195.4	17	- ve	1 : 0.9
Europe	12.4	3	0.0	142.6	13	0.9	1 : 59.4
Oceania	0.4	-	6.5	203.6	18	- ve	1 : 509.
USSR	6.3	1	1.4	142.2	12	0.3	1 : 22.6
World	476.1	100.0	1.4	1137.4	100.0	0.4	1 : 14.9
Developed	26.6	5.6	0.0	532.9	46.9	- ve	1 : 20.0
Developing	449.6	94.4	1.5	604.4	53.1	1.2	1 : 12.2

TABLE 2

SMALL RUMINANT PRODUCTIVITY BY REGION (FAO, 1983)

Region	GOATS			SHEEP		
	Meat (%)	Milk (%)	Fresh skins (%)	Mutton(%)	Milk(%)	Wool, greasy(%)
Africa	29.9	19.8	27.0	12.6	8.3	7.0
N.C. America	1.5	4.6	1.9	3.3	-	2.0
S. America	3.1	1.8	3.4	4.3	0.4	11.0
Asia West of Pakistan	14.7	19.6	10.5	16.4	46.7	13.0
Asia East of Pakistan	45.3	23.2	52.1	12.0	1.5	3.0
Europe	4.1	21.3	3.1	18.7	41.9	10.0
Oceania	-	-	-	20.0	-	38.0
USSR	1.3	4.6	2.0	12.6	1.2	16.0
World Production (10^6 MT)	2.04 * (100)	7.42 (100)	405.71 (100)	6.14 (100)	8.55 (100)	2860.34 (100
Developed (10^6 MT)	0.14 * (7.0)	1.95 (27.0)	22.49 (6.0)	3.47 (56.0)	3.71 (43.4)	1968.50 (69.0
Developing (10^6 MT)	1.90 * (93. 0)	5.47 (73.0)	383.22 (94.0)	2.67 (44.0)	4.85 (56.6)	891.78 (31.0)

***Figures in parenthesis refer to percentge contribution**

TABLE 3

LIVESTOCK PRODUCTION IN SOME COUNTRIES IN WEST ASIA*, (10^3MT)

COMMODITY	1969/71	1975	1978	1979	1980	1981 a/	Annual percentage change	
							1969/71 1981+	1981 over 1980
Whole fresh milk	3092	3549	4123	4123	4309	4542	3.3	5.4
Red meat (excl. offals)+++	512	530	576	598	613	636	1.8	3.8
Poultry meat	149	209	244	252	282	292	5.8	3.6
Eggs	133	183	223	250	280	285	6.6	1.8

Source: FAO, ICS printouts of agricultural production, March 1982 (unpublished).

*Democratic Yemen, Egypt, Iraq, Jordan, Lebanon, Saudi Arabia, Syrian Arab Republic, Yemen.

+ Preliminary ++Exponential trend +++Indigenous (Cattle & sheep & goats & Camels)

TABLE 4

Productivity from livestock in Saudi Abrabia (10^6MT, 1973-81)

Year	Red Meat+	Poultry meat	Milk++	Eggs
1973	34.3	8.7	...	114.0
1975	22.2	13.9	...	204.0
1977	21.0	22.9	...	379.0
1979	14.6	29.6	332.0	551.0
1981	...	60.0	342.5	1012.0

Source: Ministry of Agriculture and Water, Animal Production Department.

+2 From cattle, sheep, goats and camels from slaugherhouse plus % for animal slaugher outside slaughterhouses.

++28 Includes an estimated 300,000 tons from local farms.

Table 5

Ratio of Arab Agricultural Imports

to Gross World Imports * (1970, 1979, 1980%)

Commodity	1970	1979	1980
Cereals	5	10	10
(Wheat)	9	17	16
(Rice)	6	14	12
Pulses	6	11	13
Sugar	7	11	14
Live sheep	37	52	55
Red meat	1	7	10
Poultry meat	5	31	40
Eggs	9	14	17
Dairy products	4	13	15
Cost of Agricultural Imports	2.8	5.3	6.0

* By quantity

Source: United Nations Food and Agricultural Organisation (FAO), Trade Yearbook

United Nations Food and Agricultural Organisation (FAO), Magnetic Tape, September, 1981.

TABLE 6

IMPORTS OF GOAT MEAT FROM AUSTRALIA AND NEW ZEALAND (1977-78)

Country	Tonnes	Value	Main importers
Australia	3 684	-	Singapore, Malaysia, Near East, Canada West Indies and Japan
New Zealand	1 220	NZ $121000 (based on f.o.b.)	West Indies and Fiji

TABLE 7

THE EFFECT OF BODY WEIGHT ON DRESSING-OUT PERCENTAGE IN GOATS OF DIFFERENT BREED TYPES

Breed	Sex	Live-weight range (kg) 8-15	15-20	20-30	30-40	40-50	50-60	Referemce
Botswana	M (castrate)	-	-	43.18 (51.52)	44.16 (52.80)	45.19 (53.04)	48.28 (55.84)	Owen et al.(1977)
Saanen,Toggenburg Nubian,Alpine	M (entire)	-	-	47.08 (54.13)	50.47 (58.10)	50.08 (56.88)	51.92 (58.41)	Ladipo (1973)
Malawi	M (entire)	45.74 (52.38)	50.15 (56.81)	49.71 (57.22)	-	-	-	Owen (1975)
Criollo, Nubian Nubian X Criollo	M (castrate)	-	-	-	44.74	48.28	-	Acosta (1979)
Criollo, Nubian, Nubian X Criollo	M (entire	-	-	49.31	48.21	47.58	-	Acosta (1979)
Criollo	M (castrate)	41.83 (50.78)	36.94 (50.08)	38.55 (50.56)	-	-	-	Owen, Arias Cereceres Garcia Macias (1982)
Jamnapari	M (entire)	48.10	49.65	52.15	-	-	-	Pant et al.(1974)
Jamnapari	F	44.55	43.85	43.03	-	-	-	Pant et al.(1974)
Angora, Angora X Local	M (entire	49.29	47.93	53.07	-	-	-	Ghanekar, Bhatawadekar & Soman (1973)
Alpine	M (entire)	-	52.80	52.38	52.00	-	-	Fehr et al.(1976)
Katjang	M (entire)	-	44.21 (50.61)	51.39 (58.32)	52.00	-	-	Devendra (1981)

NOTE: FIGURES IN PARENTHESES REFER TO DRESSING-OUT PERCENTAGE CALCULATED ON AM EMPLY BODY WEIGHT BASIS. ALL OTHER HAVE BEEN CALCULATED ON A LIVE-WEIGHT BASIS.

TABLE 8

AREA OF EYE MUSCLE (LONGISSIMUS DORSI) IN GOATS OF VRIOUS BREEDS AT APPROXIMATLEY 20 KG LIVE WEIGHT

Goat Breed	New Zealand feral males and females (Kirton, 1970)	Sudan Desert entire males fattened (Gaili, Ghanem & Mukhtar, 1972)	Sudan Desert entire males unfattened (Gaili, Ghanem & (Mukhtar, 1972)	Philippines entire males and females (Arganosa, Ibarra & Malabanan, 1977)	Criollo castrate males (Owen, Arias, Cereceres & Garcia Macias, 1982	Alpine Nubian Saanen, Toggenburg entire males (Ladipo, 1973)
Age or slaughter weight	20 kg	Yearling	Yearling	18.97 kg	20.22 kg	20-20 kg
Area of eye muscle (CM^2)	4.12	6.53	4.03	16.12	9.10	6.84

1 Loin eye area usually taken between 12th & 13th ribs but not always stated by author.

TABLE 9

ESTIMATES OF TOTAL EDIBLE AND TOTAL COMMERCIALLY VALUABLE MEATS FOR VARIOUS BREEDS OF ADULT GOATS IN THE TROPICS (%)

Breed	Location	Total edible (%)	Total commercially valuable(%)	Reference
Small East Afrian[1]	Uganda	48.3	55.5	Wilson (1958)
Katjang[1]	Malaysia	61.2	81.5	Devendra (1966)
Indigenous[2]	Malawi	74.5	80.5	Owen (1975)
Indigenous[2]	Botswana	72.3	79.6	Owen et al. (1977)
Indigenous[3]	Botswana	71.8	79.2	Owen et al. (1977)
Indigenous	Botswana	74.3	80.9	Owen et al. (1977)
Boer[2]	Botswana	70.0	78.0	Owen et al. (1977)
Katjang	Malaysia	71.5	96.2	Devendra (1980)

[1] Females - [2] Males. - [3] Male castrates.

TABLE 10

ESTIMATED AVERAGE FLOCK PERFORMANCE UNDER EXTENSIVE SYSTEMS IN THE NEAR EAST REGION

Trait	Performance	Remarks
Kidding percentage	80-180%	Depending on rainfall and the availability of feeds
Kid mortality rate	5-40%	
Adult mortality rate	3-15%	
Average carcase weight	22 kg	Range 20-24 kg
Average milk production	50-70 kg	Per lactation
Estimated flock offtake	30-40%	Mainly male kids

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Asia West of Pakistan	53.5	11	0.4	137.5	12	2.0	1 : 2.6
Asia East of Pakistan	212.8	45	- ve	195.4	17	- ve	1 : 9.0
Europe	12.4	3	0.0	142.6	13	0.9	1 : 59.4
Oceania	0.4	-	6.5	203.6	18	- ve	1 : 509.
USSR	6.3	1	1.4	142.2	12	0.3	1 : 22.6
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