TO THE POINT CLASS LECTURES (NO. 3, 4, 5)

EQUINE & CAMEL PRODUCTION (LM 404) PART II

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Up to Date: 10 Nov 2010 - Wednesday

Feeding Behaviour and Preferences of Camel

All livestock species (free ranging animals) ingest higher numbers of forage species during the growing season than during dry season. Goats (20 and over 25 forage species in growing and dry season respectively) followed by camels (18 and 22 forage species respectively) accept the highest number of forage species resulting in a more even utilization of available vegetation. Cattle and donkeys in comparison use a very limited range of forage species, which can lead to their overgrazing.

Cattle feed near ground level for over 80% of the feeding time, thus almost exclusively using the herblayer. Camels in contrast to cattle spend less than 5% of their feeding time near ground level and about 70% at heights of over 1.0m above ground. The preference of the camel for higher vegetation strata, gives the camel the advantage of continuous access to high quality plant material since all plants reaching this height are shrubs, bushes and trees, which are deep rooted, often tapping into the groundwater and remaining green long into the dry season or throughout the year, when the herblayer is dry and highly lignified. Plant species reaching the higher strata of the vegetation as a rule belong to the dicotyledon group. Since over 90% of their intake comes from dicotyledon plants, they can be referred to as browsers, whereas cattle, feeding almost exclusively in the herblayer and on grasses, are referred to as grazers. Sheep and goats, in that order, rank as intermediate feeding types with a certain emphasis to one or the other extreme.

The one-humped camel when given the opportunity, selects a diet, which is higher in quality than the average of what is available, making the camel a ‘concentrate selector’.

When allowed free choice, its preferred diet comprises mainly browse. A diet on browse consists on average of about 35% of leaves of leguminous and other trees and 65% of seeds, pods, flowers and twigs. Its ability to select high quality feed is helped by the long neck and legs and grasping upper lip and mobile tongue. Camel in this respect is rather like the giraffe. Camels will not only eat tree fodder but also graze grasses if no or little other choice is available. In parts of Pakistan, India, in eastern Ethiopia, western Somalia, parts of Mauritania and in southern Arabian Peninsula, they are also grazers. In addition, the camels maintained by farmers in irrigated areas in Pakistan where crop agriculture is predominant, willingly eat green and dried guar and gram bhoosa.

Browsing is, however, of considerable advantage to the camel itself in reducing competition for feed resources with other species. The browsing habit is also advantageous for the camel owners in allowing them to keep a greater total biomass (more numbers) of domestic herbivores on a unit area, without contributing to increased environmental degradation and at the same time adding to the sustainability of the system.

When given a free choice, the feed preferences of the camel and its ability to select the most nutritious and digestible parts of plants ensure that it has a good quality diet that is high in protein throughout the year. It is able to maintain on a diet with minimum crude protein content of 14% in the dry season, while cattle at this period are on a very low protein diet as reported from Kenya. In terms of cellulose content, camels select a diet with the lowest value of this feed component, while cattle have the diet with the highest proportion of cellulose (Table).

Table. Crude protein and cellulose contents (% of dry matter) at three Seasons for domestic herbivore species in a part of Kenya

Livestock Species	Season and Feed Component (% of diet)					
	Dry		Intermediate		Green	
	CP	Cellulose	CP	Cellulose	CP	Cellulose
Cattle	4-5	37-40	6-8	33-39	10-12	32-36
Donkey	5-8	37-40	7-9	28-32	11-13	24-30
Sheep	9-11	20-29	10-13	17-20	15-20	21-25
Goat	11-14	15-22	11-14	16-18	17-22	16-22
Camel	14-17	14-22	14-17	13-16	18-22	14-17

Source: Wilson (1998).

Studies conducted in eastern Africa showed that camels compete least with cattle (i.e. they have least dietary overlap) for the same feed. A maximum of 8.5% of the same plant species is eaten by cattle during the green period and only 3.3% in the dry season of the year. The greatest competition for feed resources is found between camels and goats with 47.5% dietary overlap in the dry season and 12.4% in green season. Sheep (30.5 and 14.2%) and donkeys (18.9 and 7.2%) are intermediate in dietary competition with camels. Camels feeding in a national park in Sudan (which is normally not permitted) competed for the same feed resources with giraffe but there was little to no dietary overlap with antelope.

Where camels are herded, feeding and travel activities are usually limited to 12 to 15 hours that is daylight. Because they can go for long periods without water, they can thus make more effective use of time for feeding. In some areas camels spend more time resting on watering days because of the long time they spend waiting at wells or other sources. In Kenya, camels spend up to 8 hours per day actively feeding and voluntarily travel 15-18 km in search of their nutritional needs. On watering days camels travel as much as 24 km. Relatively little time is spent resting by camels during the day while out at pasture. An indication of total time spent ruminating from Somalia is 6 to 7 hours, whereas a study in Pakistan showed average ruminating time as more than 7.5 hours.Nocturnal rumination time was about thrice as much as for diurnal rumination (Khan *et al*., 1996).

FEED INTAKE AND DIGESTIBLITY OF CAMEL

Feed Intake: There is still relatively little known about the amounts of feed eaten by camels, especially under free-ranging conditions. Published results are conflicting but it does appear that intakes of feed per unit of body weight are low compared to other domestic species. This may be because of the larger body size of camels and lower energy requirements but it again emphasizes the advantages of keeping camels, since they need less feed to produce the same amount of body weight as other species. Growing camels of one year age in Tunisia had a very low voluntary intake of 1.6 kg DM/100 kg live weight with a gain of 326 to 525 g/day at a conversion ratio of 7.4 kg DM/kg of gain. Studies in Egypt have shown an intake of 4 kg DM/head/day (no live weight figures provided) to give a gain of 214 to 238

g/day. Camels drinking salt water have lower dry matter, TDN and digestible crude protein intakes than camels consuming fresh water. Camels deprived of water can increase the proportion in the feed of TDN and digestible crude protein by selective feeding.

Digestibility: The proportion of the major nutritional components that are digested (the coefficient of digestibility) is often higher in camels than in other farm ruminants. This is because camels adapt to poor quality forage if they have no alternative sources of feed, in particular by increasing the retention time in the alimentary canal. The major strategy of camels in relation to diet quality, however, is to select green parts of plants with high protein and low cellulose. This strategy is aided by low energy use, high salivary flow and high levels of ammonium for microbial synthesis. It needs emphasis that camels should be allowed as wide a choice of feed sources as possible if best use is to be made of their ability to thrive in areas where other farm animals do not.

Browsing and Grazing Plants Fed to the Camels

In deserts of Pakistan, India, Iran, some of the Middle East countries and in parts of Africa, the plants, bushes, shrubs, weeds and trees are more or less identical. Before giving a list of browsing/grazing plants it seems appropriate to discuss that camel feeds can be divided into three groups. First group: green grasses, weeds, vines, twigs and leaves of trees, shrubs and bushes; second group: includes fodders that are dried and stored for feeding and almost all the feeds used in green state and straws of some of these left after threshing and third group: concentrates of all kinds i.e. grains, oil cakes, etc. A large number of plants included in first group grow in deserts, semi-deserts and plains of tropical and subtropical areas. Except a few poisonous plants, leaves of every weed, vine, shrub, bush and tree, whether salty or bitter-tasting, are eaten by camels. With the exception of a few vines, weeds and shrubs that grow in deserts, most of them have been classified botanically and their local names are known.

Cultivated Crops for Feeding of Camels

In addition to shrubs, bushes and green leaves of trees, camels in irrigated areas are fed on green crops such as moth, guar and jowar. Camels are also fed straws obtained from crops as bajra, jowar, makki, taramira etc. and bhoosa of gram, moth, mung, guar etc.

Sometimes when a camel gets weak, green moth with grains or green guar with grains or if available lucerne and clover are also fed to help camel regain condition.

During drought years the leaves of the following trees may also be eaten by camels: *Ficus bengalensis* (banyan tree), *Ficus glomerata* (gular), *Ficus religiosa* (peepal), *Morus alba* (white mulberry), *Dalbergia sissoo* (shisham) and *Mangifera indica* (mango).

Feeding Dry Roughages to the Camels

Camels working in cities or those kept by rangers on desert area borders, under conditions of scarcity of grazing especially in summer, are fed dry roughages

and some concentrates. Dry roughages consist of bhoosa (straw), tree leaves and pods collected in rainy season. When bhoosa of two leguminous crops as moth and gram or moth and mung is mixed, it is called missa bhoosa. Mixed bhoosa is commonly fed to rangers/army camels. Bhoosa (straw) is chaffed into small pieces. Chaffed grass mixed with straw of one of two different crops is also used for feeding camels. Various types of bhoosa fed to camels, in order of preference are, moth bhoosa, gram bhoosa, mung (greengram) bhoosa and clusterbeam (guar) bhoosa (Table 5). When bhoosa is mixed with dried leaves of trees such as khejri or jharberi, it makes very palatable and nutritive ration for camels.

Protein, mineral and vitamin A contents of these leaves are high. In hilly areas maize straw is commonly used for feeding camels. According to an estimate 8.3% camels obtain their feed (green or dry forage, straws) from irrigated/cultivable areas, while the rest mainly depend on range vegetation plus an occasional feeding of some molasses, concentrates.

Feeding Concentrates to the Camels

Free ranging camels probably are never fed concentrates. Common camel keepers most often do not feed concentrates to their camels unless they become rundown. In that case they feed some millet flour or barley flour and gur (molasses) for a few days till the camel regains his condition. Those who use their camels to pull camel-carts for haulage of goods or as baggage animals, they feed them concentrates daily to maintain them in good condition. Such concentrate ration usually consists of 0.5 to 1.0 kg moth flour or bajra or barley flour and 300 to 400g gur (molasses). In winter, mustard or sesame oil is given for 15 to 20 days to camels that are in poor body condition.

Cereal or leguminous grains should be crushed and preferably soaked for about 6 to 8 hours before feeding. Oil cakes can be fed 0.5 to 1.0 kg/daily in combination with small quantities of other concentrates and gur (molasses). Cottonseed, if economical, may be given 0.5 to 1.0 kg daily crushed and soaked in water along with 450 g crushed moth, guar or gram.

It has been reported to be a convention in certain desert areas in Indo-Pakistan to feed their camels about 1 kg molasses along with 25 g pink alum during long journeys. Both these components are mixed together in 3 to 4 litres water and poured down the throat of the camel. Molasses, of course, is a source of energy and perhaps alum is administered to counteract the laxative effect of molasses

Useful Suggestions for Proper Feeding of Camels

i) Do not suddenly feed the camel with grains if he is not used to them.

ii) Do not starve the camel for long; this causes stoppage of cud chewing and the atony of the stomach.

iii) Do not feed grain or bhoosa after a long exhausting journey, especially if performed without feed and water. This may cause colic or impaction, and the camel may die. After exhaustion or fatigue, give the camel a small quantity of flour mixed with molasses and 1 to 2 litres of water and not more than 8 to 10 litres at a time, then after half an hour give him the usual feed [it seems to be,

more or less, an empirical observation, however, a part of it does have some rationale].

iv) If offered the fodder of their choice, especially green fodder such as lucerne, green moth or jowar, the camel may resort to overeating, resulting into tympanites and flatulent colic. Therefore such fodders be given in modest quantities.

v) A camel must not be taken for long fast riding after heavy feeding, for he may develop colic or tympanites.

vi) The camel thrives best in the place where he has been brought up in his early life, for he develops a liking for the local shrubs, bushes and leaves. If, however, taken away from his native area, he should be fed carefully at first till he gets used to eating new plants; otherwise he may develop digestive upsets.

vii) The camels that are not fed at home would need at least 8 to 10 hours of grazing/browsing every day.

viii) Avoid sending camels for browsing/grazing in such area that has become slippery after rains.

ix) Camels should not be allowed to graze/browse in developing reserve forests, for they will eat away tender tops of young trees.

x) Do not feed the camel whole grains and seeds, especially barley, oats, gram, cotton etc. These should be fed after crushing and soaking in water for at least 6 hours. This will enable the camel to take full advantage of the grains or seeds.

xi) When the camel is not grazing, give him common salt every evening with concentrates.

Camel as a Milch Animal

Camel as a Milch animal

Camel got the advantage over the cow and buffalo that it continue to eat even in the hot climate. It has been proved that in the presence of adequate feed or water is available after 10 days there will be no effect on the production

It is also suggested that production is improved by daily watering.

Camels milk become more diluted in the period of water shortage we can say as that camel does not conserve water by restricting the milk yield during the period of dehydration this is the physiological adaptation to keep the calf hydrated.

How much milk is produced by the camel?

Camel can produce 50 litter of milk per day.

Standard lactation period is 305 days.

Lactation yield is 1200-10700 litters

Camel which are kept on grazing they produce 1123 litters in a lactation of 13 months with a peak production of 4.4 litter on a day 56.

Variations in the lactation length is also observed so it is from 9-18 months

Camel tends to dry when she is 4 month pregnant. With better feeding or delayed calf weaning lactation length is usually prolonged. Presence of the calf is important for the lactation of the animal. Increase calf mortality is there in camel this has an adverse effect on the camel production because the calf is needed for the letdown.

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