Mesquite (*Prosopis juliflora*) Pods as a Feed Resource for Livestock
- A Review -

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ABSTRACT : Mesquite or Vilayati babul (*Prosopis juliflora*) is a drought resistant, evergreen, spiny tree with drooping branches and a deep laterally spreading root system. It grows in semi-arid and arid tracts of tropical and sub-tropical regions of the world and is spreading because the leaves are unpalatable and animals do not digest its seed. The mesquite has become a major nuisance; cutting or pruning its branches to form a canopy would provide shade for travelers, aid harvesting of pods, as well as make available wood for fuel. An average plant starts fruiting by 3-4 years of age and yields annually 10-50 kg pods/ tree, which can be collected from May-June and September-October. Availability of pods worldwide is estimated to be about 2-4 million metric tonnes. Ripe pods are highly palatable; on dry matter basis they contain 12% crude protein, 15% free sugar, a moderate level of digestible crude protein (7% DCP) with a high level of energy (75% TDN). The pods contain low tannin levels below those toxic to animals. Seeds contain 31-37% protein; pods should be finely ground before feeding to facilitate utilization of the seeds. Mesquite pods could replace costlier feed ingredients such as grain and bran contributing 10-50% of the diet. Phosphorus supplements need to be added when mesquite pod, exceeds 20% of animals' diet. ***(Asian-Aust. J. Anim. Sci. 2004. Vol 17, No. 5 : 719-725)***

Key Words : Mesquite Pod, Feed, Livestock

INTRODUCTION

Availability of conventional feed resources is declining as livestock populations increase and grazing land declines with more urbanization to satisfy the increasing human population. Thus it is difficult for livestock owners to feed their stock and sustain production of less productive land. Hence suitable supplements are needed to provide sufficient feed for the animals. Efforts have thus been made to evaluate the availability of supplements and the levels at which they can be safely fed to livestock.

To compensate for lower availability of feed resources for animals, new plant species have been tried to maintain vegetative cover over deserts or land with poor fertility. *Prosopis juliflora* grows in areas with little rainfall and on sandy, saline, stony or other lands unsuitable for cultivation. Mesquite is useful as a fuel wood, and livestock do not consume twigs or leaves. It produces pods twice a year. Ripe pods fall on to the ground and are avidly consumed by all ruminant species. Mesquite pods have been incorporated into feeds for cattle, sheep, camel, buffalo, rabbits, poultry and rats especially in South America, Africa and India. The article reviews available information on mesquite plant distribution, its pod production, chemical composition and nutritive value, anti-nutritive factors, and the effects of adding mesquite pods as dietary supplement on carcass growth, milk production, wool growth, rumen metabolism and the economics of its use. Future lines of work are also suggested.

DESCRIPTION AND DISTRIBUTION

Mesquite or Vilayati babul (*Prosopis juliflora*) is a xerophytic evergreen tree; it thrives on all soil types under variable climatic conditions (Anonymous, 1969). The tree is typical of those growing in arid and semi-arid regions. It has a tap root system to locate subterranean water; stems are greenish brown, sinuous and twisted. Mesquite trees have stems 6-9 m in height about 45 cm in diameter with strong axial thorns; the bark is rough and dull red in colour; leaves are compound, bipinnate with 12-25 pairs of green foliates; flowers are lateral to axis; fruit is a non-dehiscent pod, curved and about 4 mm thick, 1 cm wide and up to 15 cm in length made up of light yellow hardened epicarp, fleshy mesocarp and woody endocarp which contains seed (Silva, 1986). The mesquite plant is drought resistant and its suitability as soil binder as well as a windbreaker is well known (Mendes, 1986). Due to low leaf palatability livestock avoid it, but its pods may be a suitable livestock feed. *Propsopis juliflora* can grow in arid and semi-arid regions because of its resistance to drought and heat and it has many potential uses (Mendes, 1986). Reports indicate that Mesquite originated in South America (Gomes, 1961; Silva, 1986) and from there it spread to United States of America, Central America, West Indies, Africa, Hawaii and Asian continent. Mesquite seeds were introduced from Kew to the Indian sub-continent in 1877 at Sind (Vimal and Tyagi, 1986) and to an arid tract of western Rajasthan in 1913 (Mathur and Bohra, 1993). It has now naturalized in dry parts of the country. Thus *Prosopis juliflora* has world wide distribution, mostly in the tropical regions of the world.

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Table 1. Chemical composition and nutritive value of *Prosopis juliflora* pods (% of DM)

CP	EE	CF	NFE	ASH	Silica	Digestibility				DCP	TDN	Reference
						DM	CP	NFE	GE			
Whole pod*												
13.9	3.0	27.7	50.6	4.8								Gohl. 1975
10.06	4.26	30.77	50.33	4.59						6.86	70.51	Mahadevan. 1954
12.26	3.59	25.59	53.24	5.06	0.27					7.00	75.00	Talpada et al., 1979
										9.6	54.4	Gaur et al., 1982
16.5	4.2	16.9	57.0	5.4								Rao and Reddy. 1983
14.7												De Valle et al., 1983
12.5-14.8		21.4-27.2	48.9-53.1	4.9-12.9								Gabar. 1986
12.29	3.79	18.99	59.8	5.12	0.15							Talpada and Shukla. 1988
						71.1	66.8	69.8				Barbosa. 1977
						82.56	80.13	83.19				Barrows and Filho, 1986
11.99	3.47	19.42	58.90	6.22	0.59							Anonymous. 1987
							68.79			5.57		Silva et al., 1989
8.48		18.55							4,040			Silva et al.. 1990
15.23	3.67	19.23	55.84	6.03								Reddy et al.. 1990
12.48												Shukla et al., 1990
12.4	1.3	22.0	48.9	3.2								Negreiros. 1992
7.33-12.65			16.33-41.0									Sharma. 1994
12.16	3.48	24.73	52.53	7.10								Sharma, 1997
13.5	4.0	20.9	54.7	6.9	1.0							Talpada et al.. 2002
Hulls												
4.3	0.6	54.3	37.4	3.4								Gohl. 1975
11.3												De Valle et al.. 1983
7.62	2.45	19.93	61.59	8.41	2.11							Talpada et al., 1987
							65.63			2.61		Silva et al.. 1989
9.24		14.8							4,291			Silva et al., 1990
9.17												Shukla et al., 1990
8.96	1.90	26.56	57.06	5.51								Chopra and Hooda. 2001
Seed												
65.2	7.8	2.8	19.0	5.2								Gohl. 1975
37.2												De Valle et al., 1983
34-39												Mendes. 1986
			62.9-71.2									Escober et al.. 1987
30.62												Shukla et al., 1990
33.70	3.75	6.67	52.76	3.11								Chopra and Hooda. 2001

* Whole pod: pod with seed, CP: crude protein, EE: ether extract. CF: crude fibre. NFE: nitrogen free extractives. Ca: calcium, P: phosphorus, DM: dry matter. GE: gross energy, DCP: digestible crude protein, TDN: total digestible nutrients.

Production of pods

Prosopis juliflora bears pods in summer and winter. The pods can be collected in May/June and September/October. Peak pod production occurs at 15-20 years of age. Mesquite starts fruiting at 3-4 years of age; 10 year-old plants may yield up to 90 kg pods annually (Anonymous. 1969), however, annual pod yield ranges up to 100 kg/tree (Gomes, 1961; Jurriaense. 1973; Felker and Waines, 1977; Felker et al., 1984; Shukla et al., 1986). A high yield of 169 kg/tree/year has also been reported (Mendes. 1986). Production of pods from the whole of India has been estimated to be two million tonnes (Punj, 1995) indicating availability of a large feed resource that may be used by feed processing industries for livestock.

Chemical composition and nutritive value of mesquite pods

Reports on the composition and nutritive value of Mesquite pods (Table 1) show that they are a potential source of protein and energy. although pod composition varies with location (Chopra and Hooda. 2001). Mesquite pods have high palatability and nutritive value (Mahadevan. 1954; Anttilla et al., 1994) and. when crushed, have been eaten by cattle, sheep and goat without any adverse effects on their performance (Anonymous. 1969). Mesquite pods are rich in saccharose (20-25% of DM) and reduced sugar (10-20% of DM) (Silva, 1986). They have a high content of calcium and phosphorus but the content varies depending upon season, soil type, year, etc. Mesquite seeds contain crude protein (CP) content of 34-39% of DM (Mendes, 1986), 21.6-29.1% mucilage (with >85% Nitrogen Free

Table 2. Macro and micro mineral content in *Prosopis juliflora*

Whole pod/seed	Ca (%)	P (%)	Mg (%)	Na (%)	K (%)	Cu (ppm)	Zn (ppm)	Mn (ppm)	Fe (ppm)	Season	Reference
Whole pod	0.33	0.23									Mahadevan, 1954
Whole pod	0.41	0.17									Talpada et al., 1979
Whole pod	0.61	0.20									Anonymous, 1987
Whole pod	0.71	0.08									Talpada et al., 1987
Whole pod	0.44	0.17									Talpada and Shukla, 1988
Seed				0.05	0.32	27	64	31	142		Morangoni and Alli, 1988
Whole pod						12.5	18.3	22.3	203.5	Summer	Talpada et al., 1989a
Whole pod						15.5	28.8	22.1	638.8	Winter	
Whole pod	0.49					14.0	23.6		421.2		Shukla et al., 1990
Seed	0.48										
Whole pod	0.52	0.19									Sharma, 1997
Whole pod	0.60	0.20									Talpada et al., 2002
Seed	0.21	0.34	0.13	0.01	0.43	25.0	48.1	45.8	255.3		Chopra and Hooda, 2002

Ca: calcium, P: phosphorus, Mg: magnesium, K: potassium, Cu: copper, Zn: zinc, Mn: manganese, Fe: iron.

Extract NFE) and 30-40% cotyledon (with 27.4-70.3% CP and 62.9-71.2% NFE) (Escober et al., 1987). After detailed chemical analysis Morangoni and Alli (1988) observed that seeds were richer in CP (35%) as compared to whole pods (10%) but there was no difference in their NFE content. In pods 75% of the sugar is in the form of sucrose and linoleic acid is the predominating unsaturated fatty acid; 75% of total protein is extractable wherein lysine was the predominating amino acid (312 mg/g N) in seeds and pods (438 mg/g N) and methionine was the most limiting amino acid while the concentration of other amino acids viz., valine, leucine, tyrosine and phenylalanine were within limits required for ruminants. Concentration of sulphur containing amino acids is low but the content of other amino acids exceeds those required for non- ruminants (Talpada and Shukla, 1988a). Ca, P, Mg and K were lower than cultivated legumes such as *Cymopsis tetragonaloba*, *Cicer arietinum*, *Vigna ungiculata*, *Phaseolus mungo* etc.

Wide variation in proximate constituents (CP-Crude Protein, EE-Ether Extract, CF-Crude Fibre, NFE- Nitrogen Free Extract, Ash) has been observed (Table 1) in the pods. Reports indicate (Barros and Filho, 1986) that pods have high digestibility coefficients (DM-82.6%; CP-80.1%; NFE-83.2%). Studies in India revealed digestibility coefficients of whole pods to be 34.4, 43.3, 51.3, 82.2 and 70.4 for CP, EE, NFE and OM respectively (Talpada et al., 1987). Total sugar content varied between 13.3-19.9% of DM depending upon tree, season and year; further more sulfur containing amino acids were present in lower amounts but most of the other amino acids exceed the requirements of ruminants (Talpada and Shukla, 1988a).

Mesquite pods as whole and the pericarp meal contained 68.8 and 65.6% digestible DM; 5.6 and 2.6% digestible protein; 2,880 and 2,675 kcal/kg digestible energy; 2682 and 2,466 kcal/kg metabolizable energy; 2,642 and 2,432 kcal/kg nitrogen corrected metabolizable energy respectively (Silva et al., 1989). Further studies revealed that whole pod and pericarp contained 4,340 and 4,291 kcal/kg gross energy respectively (Silva et al., 1990).

Protein content and sugar contents varied between 7.3-12.7% and 16.3-41.0% of DM respectively but no correlation was observed between protein and sugar content but the protein content was more stable than the sugar content; however, sugar content decreased with the increase in rainfall (Sharma et al., 1994).

Biochemical studies revealed that protein of pods inhibited trypsin in stoichimetric ratio of 1:1. It had only weak activity against chymotrypsin and did not inhibit human salivary or porcine pancreatic alpha amylase. The complete amino acid sequence of pods consisted of two polypeptide chains i.e. 137 residues of alpha chain and 38 residues of beta chain linked together by a single disulphide bond (Negreiros et al., 1992).

Status of macro and micro minerals in *Prosopis juliflora* whole pods and seeds evaluated by different researchers has been compiled in Table 2. In whole pods calcium content ranged from 0.32 to 0.60% while the phosphorus ranged from 0.08 to 0.41%. The seeds of mesquite had 0.32 to 0.43% potassium, 0.13% magnesium, and 0.01 to 0.05% sodium. Content of iron, zinc and copper (Table 2) was found to be higher in pods collected during winter than during summer while manganese content was not affected due to season (Talpada et al., 1989a). Mineral content have been found to vary with location (Chopra and Hooda, 2002). It may be inferred that pods contain sufficient amount of Ca, P, Mg, K, Na, Cu, Zn, Fe and Mn required for livestock.

Anti-nutritional factors

Uncontrolled grazing of mesquite pods as the sole source of food showed deleterious effects on cattle (Felker and Waines, 1977). Consumption of green immature pods reduced appetite and caused weight loss, weakness, alopecia, nervous symptoms, diarrhoea, fever, dehydration and death of cattle (Gabar, 1986) and thus only mature pods

Table 3. Use of Mesquite pods in the diet and an evaluation of safe feeding level for different animal species

No	Reference	Replacement	Specie	Result	Limitation	Anticipated safe level
1	Mahadevan 1954	Conventional feeds in CM	Bullock	Pods fed safely, no cynogenic glucoside		
2	Buzio et al., 1972	Sorghum in feed	Sheep	Feed intake not affected	Lower gain at 60% level	<60% of CM
3	Barbosa 1977		Bovine	Pod crushing did no influence intake		
4	Talpada et al., 1979	Conventional feeds in CM	Growing calves	Feed intake, digestibility, balance of N, Ca, P not affected	-P balance at 30% level	<20%
5	Silva 1986	Wheat bran up to 100%	Laying hen	Feed intake, FCR & egg production not affected		100% of wheat bran
6	Shukla et al., 1981	Unconventional feeds in CM	Cattle	Feed intake & milk production not affected		<20% of CM
7	Talpada et al., 1982	Conventional feeds in CM	Cattle calves	Pods fed safely		20% of CM
8	Gujarthi et al., 1982	Conventional feeds in CM	Bullock	Pods fed safely	-P balance at 45% level	30% of CM
9	Guar et al., 1982	Conventional feeds in CM	Camel	Feed intake, digestibility, balance of N, Ca, P not affected		20% of diet
10	Rao and Reddy 1983	Wheat bran up to 40% CM	Bullock	Feed intake, digestibility, balance of N, Ca, P not affected		40% of CM
11	Talpada et al., 1983	Conventional feeds in CM	Cattle calves	Balance of N, Ca, P not affected		20% of CM
12	Silva et al 1983	Wheat bran up to 100% CM	Bovine	Feed intake & digestibility not affected		100% of wheat bran
13	Ibrahim and Galili 1985	55-100% of diet	Buck	Weight gain, dressing % inversely related to pod content		55% of diet
14	Barros and Filho 1986	Molasses	Ovine	Intake and nutrient digestibility not affected		100% of molasses in CM
15	Barros et al., 1986	Cassava in CM	Sheep	Intake and nutrient digestibility not affected		100% of cassava in CM
16	Farios et al., 1986	Casien	Rat	Can be used for protein replenishment		
17	Gabar 1986		Bovine	Immature pods caused toxicity	Seed pass in faeces	
18	Mendes 1986	Corn & wheat floor	Bovine	Excellent palatability	Seed pass in faeces	
19	Talpada et al., 1988	Conventional feed ingredients	Lactating cattle	Nutrient intake & digestibility not affected	-P balance at 30% level	<30% of CM
20	Silva et al., 1990	Conventional feed stuffs	Rabbit	Nutrient intake & digestibility not affected		30% of diet
21	Negreiros 1992	Corn, wheat	Rat	Weight gain, PER & NPU better than corn, wheat		
22	Pinheira et al., 1993	Maize, soy bean meal diet	Pig finishing stage	Increasing linear effect on back fat thickness & meat:fat ratio	Feed intake, weight gain -vely related to pod content	30% of diet
23	Ravikala et al., 1995	Wheat bran in CM	Lamb	No effect on growth	Lower FCR at 30% level	<30% of CM
24	Sharma 1997	Barley & rice bran in CM	Sheep	Feed intake, digestibility, balance of N, Ca, P not affected	Lower gain, CP digestibility at 75% level	50% of CM
25	Talpada et al., 2002	Rice bran up to 20%	Growing calves	Pods can be fed safely, balance of N, Ca, P not affected		20% of diet

CM: concentrate mixture, CP: crude protein, FCR: feed conversion ratio, N: nitrogen, Ca: calcium, P: phosphorus, PER: protein efficiency ratio, NPU: net protein utilization.

should be fed. Cyanide poisoning was observed in cattle grazing seeds of the mesquite tree (Seifert and Beller, 1969) whereas Shukla (1982) did not observe any toxic effect after feeding 5.5 kg sugar cane tops with 3.2 kg mesquite pods per cattle. The pods of the mesquite tree were a major source of food for Native Americans in southern California and on the lower Colorado river (Felker and Waines, 1977).

Pods do not contain cynogenic glycosides and can be safely used as feed for livestock (Mahadevan, 1954). Cyanogenic glycosides were absent in seed, mucilage and cotyledons but alkaloids were detected in whole seed (Escober et al., 1987) but no adverse effects on nutrient digestibility and production have been observed due to them. Tannin contents of seeds and whole pods were found to be 1.9 and 1.5% of DM respectively (Talpada et al., 1989b). Makkar et al. (1990) reported that mesquite pods contain low levels of phenols and condensed tannins, the latter being below those needed for harmful effects on animals, again reinforcing their value as an animal feed.

Effect of feeding Mesquite pods on nutrient intake, feed utilization and animal performance

Results of feeding *Prosopis juliflora* pods and estimated safe feeding levels for different ruminant species and laboratory animals are summarized in Table 3.

Effect of processing of Mesquite pods on feed intake and nutrient digestibility

Crushing and drying of mesquite pods did not influence voluntary intake in ruminants (Barbosa, 1977), grinding pods allow complete utilization (Gabar, 1986). Grinding also ensures the seeds are properly utilized (Mendes, 1986). *Prosopis juliflora* pods up to 20% of the diet did not affect feed intake in cattle (Talpada et al., 1983). Feed intake was not affected in cattle fed concentrate mixtures containing 40% mesquite pods on DM basis (Rao and Reddy, 1983). Replacement of sorghum with mesquite pods up to 60% of the diet (% DM basis) did not affect feed intake in sheep (Buzio et al., 1972).

At a level of 10%, feed intake and nutrient digestibility were not affected with diet containing unconventional ingredients (Shukla et al., 1981). Replacement of molasses in sheep and goat diets (Barros and Filho, 1986) and cassava in a concentrate mixture for sheep (Barros et al., 1986) with mesquite pods as energy supplement, did not affect digestibility of dry matter, protein and energy. Pods can be safely fed up to 20% of the dietary intake of cattle without adverse effect on nutrient digestibility (Talpada et al., 1983, 2002). Digestibility coefficients of pods were reported to be 71.1% for DM, 66.8% for CP and 69.8% for gross energy (Barbosa, 1977) indicating the suitability of mesquite pods as partial replacement for costlier grains used conventionally for livestock feeds. Complete replacement of wheat bran with mesquite pods in the ration of bovines did not affect nutrient digestibility (Silva et al., 1986). Nutrient digestibility was not affected in lactating cows when mesquite pods replaced 30% of the conventional ingredients in a concentrate diet (Talpada and Shukla, 1988b). Digestibility of dry matter, crude protein and energy were not affected when mesquite pods constituted up to 30% of the diet of rabbits (Silva et al., 1990).

Effect of mesquite pods on growth and production

Growth of cattle calves continued to be normal even when 20% of conventional feeds were replaced with mesquite pods (Talpada et al., 1982) even with diet containing 30% wheat straw (Talpada et al., 2002). Lower weight gain was observed when 60% of sorghum grain was replaced with mesquite pods in the diet of sheep (Buzio et al., 1972). Growth was not affected up to 50% but it decreased about 30% when mesquite pods accounted for 75% of the concentrate diet of sheep (Sharma, 1997). However, reduction in weight gain, dressing percentage and carcass percentage occurred when goats were fed a diet containing ≥85% of mesquite pods (Ibrahim and Gaili, 1985).

Replacement of 30% of conventional ingredients of the ration with pods for lactating cows did not affect nutritive value of the diet, daily milk yield, fat corrected milk yield, efficiency of conversion of feed dry matter and energy to milk (Talpada and Shukla, 1988c; Talpada and Shukla, 1990).

When mesquite pods were used to gradually replace a maize-soyabean mixture in the diet of finishing pigs, the feed intake gradually decreased as did their back fat thickness and meat: fat ratio in the carcass increased (Pinheira et al., 1993); with these authors suggesting mesquite pods were an unsuitable supplement for pigs. Feed intake, feed conversion efficiency, egg weight and egg production were unaffected when wheat bran was replaced with mesquite pods in the ration of laying hens (Silva, 1986).

Effects on nitrogen, calcium and phosphorus balance

Mesquite pods can represent up to 20% of cattle diets without adverse effects on nitrogen, calcium and phosphorus retention (Shukla et al., 1981; Talpada et al., 1983, 2002). These observations also applied to cattle fed concentrate mixtures containing 40% mesquite pods (Rao and Reddy, 1983). Positive nitrogen and calcium balance but negative phosphorus balance occurred when growing calves were fed *Prosopis juliflora* pods, indicating the need for phosphorus supplementation (Talpada et al., 1979). Negative phosphorus balance was also observed in bullocks when pods represented 45% of their diet (Gujrathi et al., 1982a). Level of nitrogen and phosphorus balances decreased when mesquite pods made up 75% of the concentrate diet of sheep (Sharma, 1997). Replacement of molasses with mesquite pods (Barros and Filho, 1986) and cassava as an energy supplement in a concentrate mixture (Barros et al., 1986), did not affect nitrogen balance in sheep.

Effect on rumen metabolism

Rumen metabolites were not affected in young cattle when mesquite pods comprised up to 20% of DM of their diet, apart from low ammonia nitrogen, indicating its efficient utilization by microbes provided with a higher soluble sugar enabling available nitrogen to be used for microbial growth (Talpada et al., 2002). Supplementation of mesquite pods at 30% of the concentrate diet of cattle had no deleterious effect on rumen metabolites (Talpada and Shukla, 1987). Feeding lambs up to 30% DM of their diet as mesquite pods did not affect rumen metabolites (Ravikala et al., 1993), with a similar effect on bullocks fed up to 45% DM from mesquite pods in their diet (Gujrathi et al., 1982b). Rumen pH and concentration of volatile fatty acids as well as ammonia nitrogen were not affected when pods comprised 75% of concentrate mixtures for sheep (Sharma, 1997). Thus mesquite pods did not affect rumen metabolism adversely when used at moderate levels.

Effects on blood profile

With mesquite pods accounting for 30% of concentrate diet of cattle there was no effect on red cell count, white cell count, hemoglobin, blood glucose, calcium, phosphorus, copper, zinc and iron levels in the blood (Talpada and Shukla, 1988d). These results were confirmed for hemoglobin, blood calcium and phosphorus levels for bullocks fed *Prosopis juliflora* pods up to 45% DM of their diet (Gujrathi et al., 1982a).

Economics of feeding

Feed costs were unaffected in cattle when rice bran was replaced with mesquite pods up to 20% of the diet (Talpada et al., 2002) whereas, cost of feeding could be reduced up to 50% with mesquite pods providing up to 20% in the maintenance diet of camels (Gaur et al., 1982). Replacement of wheat bran with pods in the concentrate mixture of lambs reduced cost of feeding without adverse effect on growth (Ravikala et al., 1995). Replacement of conventional ingredients such as maize, barley, wheat bran, rice bran etc with mesquite pods to the extent of 30% in the diet of lactating cattle improved profitability in milk production with no effect on milk yield (Talpada and Shukla, 1988c). Feed costs were reduced by 26% when mesquite pods replaced up to 50% of the concentrate diet of sheep, without affecting their growth (Sharma, 1997). These results show mesquite pods could be used as a cheaper natural feed resource for livestock.

Conclusion and future line of work

Prosopis juliflora leaves are unpalatable for most livestock but mature pods (with or without seeds) are highly palatable. Mesquite plants bear pods twice a year yielding 10-50 kg pods/plant annually. The wide distribution of the mesquite plant in tropical and subtropical regions of the world, and its fruit bearing cycle, collection of large quantities of pods from forest areas and roadsides is possible, also providing income for poor people. Ripe pods are attractive to animals as they contain free sugars (15% of DM), which have a sweet taste. The spongy mesocarp and cartilaginous endocarp of pods can block the sieve during grinding, hindering proper crushing of seed. The seed has a high level of protein (31-37%) and energy. Unprocessed seeds pass through animals undigested, so the pods should be finely ground before feeding to maximize utilization. Thus changes to the sieve structure needs to be defined to facilitate proper grinding. Chemical nature of the pods could be exploited as binding agent for preparing pelleted foods due to presence of more than 20% mucilage in the pods. Research is required to prevent insect attack before collection of pods in the field and during storage before feeding. Studies are also needed to evaluate the relationship between pod maturity and toxin content so that the best harvesting time can be defined for farmers and with minimum insect damage. Pods contain high levels of energy (75% TDN) and moderate levels of protein (12% CP, 7% DCP), so they could be used as the sole feed supplement during flushing and early lactation to improve production performance of sheep, goat and cattle. Phosphorus supplements need to be fed when mesquite pods make up more than 20% of the concentrate mixture. Experiments need to be conducted to evaluate the extent of phosphorus supplementation with increased levels of pods in the diet of livestock. The pods could be safely used as a cheaper feed resource by replacing of bran and up to 50% of grain component of diets of cattle and sheep.

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