Feeding Prickly Pear Cactus (PCC) to Ruminants

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Feeding PPC Ruminants

- Arid and Semiarid lands cover > 50 % of Mexico's territory
- Extreme environmental conditions
- Long drougth periods
- Forage scarcity
- Limit animal production
- Find new alternatives as forage
- Prickly Pear Cactus

PPC Characteristics

- Availability
- Nutritional Composition
- Low cost

IMPORTANCE OF CACTUS IN ARID AND SEMIARID LANDS

- Always green
- Helps to preserve ecological equilibrium
- Long life
- Cold and heat tolerant
- High adaptation to different soils
- Disease resistant
- Do not compite with grasses because of root system
- Low maintenance cost

PPC Characteristics

- Better efficiency to produce dry matter because of the photisynthetic mechanism
- Year around green and suculent, even during dry periods.
- Produce forage, fruit, and other useful products.
- Prevention of soil degradation.

PPC Characteristics

Nutritional Content
- High water content
- Medium energy content
- High Calcium and Potassium content
- Medium fiber content
- Low protein and phosphpurous content

Cactus as Forage

Table 1. Chemical composition (*Opuntia spp.*)

Specie	DM	CP	NFE	EE	CF	ASH
O. robusta	10.4	4.4	57.6	1.7	17.6	18.6
O. lindheimeri	11.6	4.1	66.8	1.0	16.2	25.5
O Ficus-indica	11.3	3.8	77.1	1.4	17.6	13.1
O. rastrera	14.4	2.8	40.2	0.8	16.2	40.1
O.engelmanii	15.1	3.3	60.3	1.2	3.6	31.6
Mean	11.1	4.1	67.0	1.3	17.1	19.1

Cactus as Forage

Table 2- In situ Dry Matter Digestibility of 4 cactus species

Time (hr.)	O. lindheimeri Var. lind. (%)	O. rastrera (%)	O. megacantha (%)	O. lindheimeri Var. subarmatha (%)	mean
0	10.60	21.10	5.60	8.21	11.23
3	11.07	23.38	10.79	11.06	14.08
6	28.51	33.90	12.19	17.30	15.48
12	37.57	35.71	28.72	18.28	25.20
24	47.73	39.84	32.88	32.37	38.21
48	68.81	41.74	49.15	54.13	53.46
72	86.27	54.67	57.25	62.56	65.30

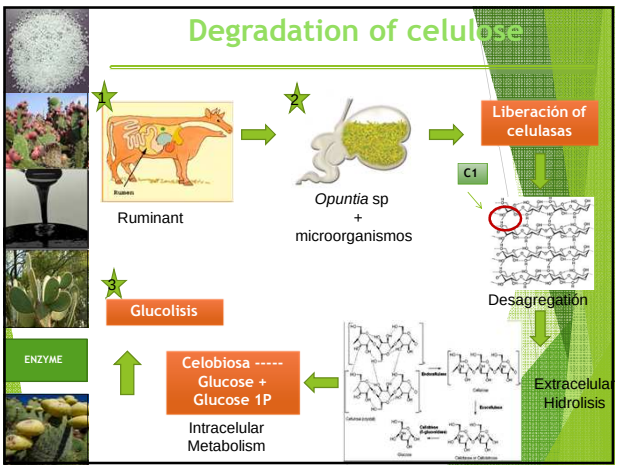
¿What do we need?

To increase utilización of nutrients

To increase nutrient content (protein)

Components of Cell Wall

- Celulose → 20-38%
- Hemicelulose → 4-11%
- Lignin → 2-8%
- Pectic substances → 20-38%



Use of Cactus can

- Lower cost of production
- Less need of buying forage during dry seasons.
- Water reservoir
- Helps to preserve humidity
- Benefits wildlife
- Helps to establish grasses

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Use of Cactus can

Cover requeriments
- Calcium
- Sodium
- Potasium
- Magnesium

Deficient
- Phosphourous
- Copper
- Manganese

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Limitations

- Cactus used as forage are wild
- No Control
- Do not use
  - Improved Varieties
  - Production techniques
  - Crop techniques
  - Processing techniques
- Requiere large quantities to cover nutrient requirements of animals
- Spines can harm animals when consumed direct

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Most used species

- *Opuntia rastrera*
- *O. lindheimeri*
- *O. cantabrigiensis*
- *O. streptacantha*
- *O. leucotricha*
- *O. robusta*
- *O. imbricata*
- *O. leptocaulis*
- *O. microdasys*
- O. pheacanta

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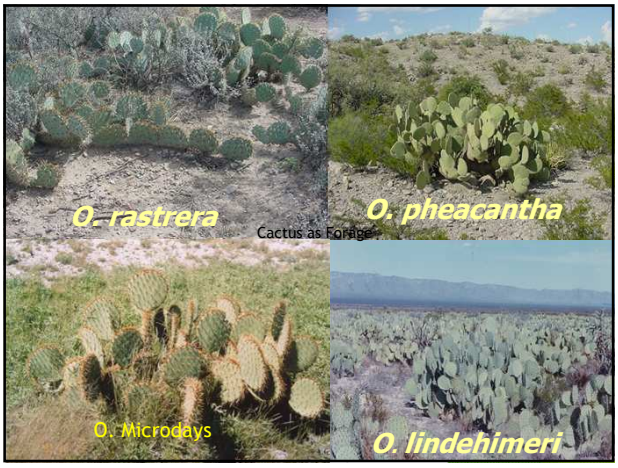

Cactus as Forage

- Processing method 1
  - standing plant
  - burn spines
  - cut edges of plant

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Cactus as Forage

- Processing method 2
  - cut parts of plants
  - transport them to animal unit
  - burn spines
  - chop
  - offer to animal

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Cactus as Forage

- Processing method 3
  - cut parts of plants
  - transport them to animal unit
  - make silage
  - offer to animal

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SILAGE

Cactus as Forage

- Processing method 4
  - cut parts of plants
  - transport them to animal unit
  - Mechanical processing
  - offer to animal

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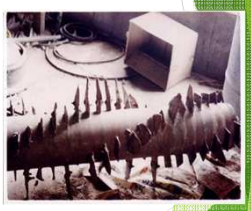
Cactus Cutter



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Dairy

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Cactus can be feed

- Dairy cattle
- Beef cattle
- Sheep
- Goats
- Pigs
- Poultry
- Camels
- Wildlife

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Cactus as Forage

- High palatability
- High digestibility
- Easy management
- Resistant to transportation
- Good recovery rate
- Productivity
- Easy establisment

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Urea

Alfalfa

PPC

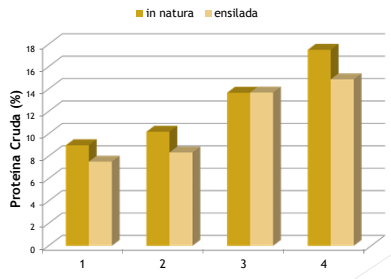
Molases

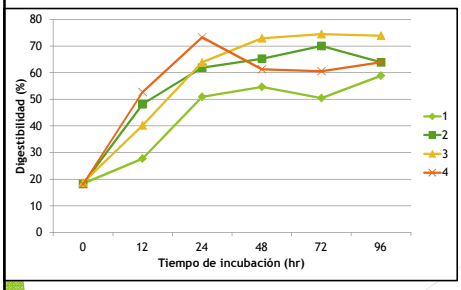
PPC

Factor A: *in natura*, Ensilada

Factor B

(%)	PPC			
	1	2	3	4
PPC	100	80	70	60
Molases	---	10	10	10
Yeast	---	10	---	10
DBG	---	---	20	20





OM Digestibility of PPC

Animal Performance using cactus

- Dairy cattle
- 25-40 kg/day=milk 5-15 kg
- Beef cattle
- 10-40 kg/day=gain 0-0.500kg
- Sheep
- 0.116-0.232 g/day= gain 0-100g/day
- Goats
- 0.138-0.276 g/day= milk 50-150 g/day

Dairy cattle

- Consumption of cactus 20 a 30 kg. per day
- Cactus was chopped.
- Suplemented with corn stover , alfalfa, sorghum, grass and agave.
- Production levels between 14 to 18 kg per day per cow

Cactus supplied

- 4.5% NEl
- 12.2% protein
- 46% crude fiber
- +100% Ca
- 15% P

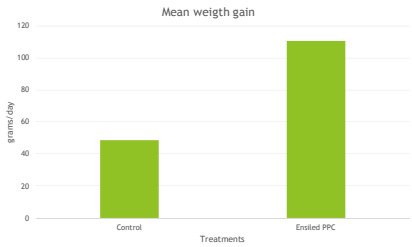
Beef cattle

- Consumption of cactus between 10 a 20 kg. per animal per day
- Animals were grazing
- Average daily gain betwwen .1 a .6 kg.

Cactus supplied

- 7.8% Enm
- 20.6% protein
- +100 % de Ca
- 50% de P

Goats

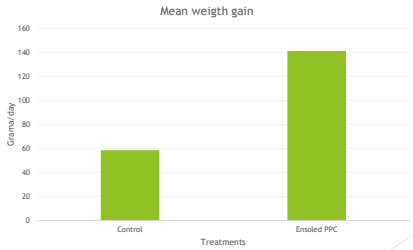


Sheep

- Twenty Dorper male
- Initial weight 18-22 kg




Sheep



RESULTS

Table 3. Productive performance of beef cattle

Variable	Treatments		
	Grazing	PPC	PPC+enzyme
DMC Kg/d*	6.7[b]	6.7[b]	7.2[a]
ADG Kg/d*	0.751[b]	0. 792[b]	1.034[a]
FC Kg*	9.1[a]	8.54[ab]	7.0[b]

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RESULTS

Table 3. Productive performance of sheep

	Treatments		
	Grazing	PPC	PPC+enzyme
No. of animals	3	4	4
Initial wt (kg)	23.73	20.65	20.85
Final wt (kg)	23.96	26.35	25.9
ADG (kg)	0.0039	0.0952	0.0842
Feed comsumption/day (kg)	0.2754	0.3533	0.3541
Feed Conversion (kg feed/kg gain)	3.585	3.72	4.208

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- **Conclussions**
- Cactus (*Opuntia spp*) are a valuable resource for animal feeding in arid and semiarid lands.
- Cactus (*Opuntia spp*) can be an important crop in South Africa for Ruminant Feeding.

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Thank you

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