

A Cooperative for cattle production based on Vetiver grass forage established In Yunnan Province, China.

Vetiver stem and leaves make excellent fodder with high nutritive value if cut and fed when young. It was showed that the protein content in fresh Vetiver stem and leaf was higher than that in alfalfa, *Symphytum officinale*, clover, sweet potato vine, and rice straw and a little lower than that of milk vetch. Protein content of Vetiver hay was lower than that of alfalfa but higher than that of maize silage and common winter livestock fodders such as rice and highland barley straws. Moreover, the methionine content of Vetiver was almost the same as other fodders, while the lysine content was much higher. Thus fresh Vetiver as fodder is beneficial for livestock growth and provides a quality feed for cattle, sheep, pigs, rabbits, and fish, especially for cattle and sheep because of good palatability.

At the Jiangxi Red Soils Institute, Vetiver biomass that was cut at two week intervals was completely eaten by cattle, Vetiver cut at one-month growth was 91% consumed. When fed to fish (grass carp), feeding rates of Vetiver shoots with half-month and one-month were 59-71% and 44-56%, respectively, indicating that the tender/younger Vetiver provides a better feed. Thus Vetiver is not only valuable for on farm soil and water conservation, but also has value as a fodder, both fresh and as hay, for livestock.

A good example of a farmer using Vetiver as a forage crop is Mr. Shouxiang Li, in Chetian village, Xiaogucheng town, Yiliang county, Yunnan province. He started cultivating Vetiver for livestock feed in in 2012 with the help of Kunming Guangbao Biotechnology Engineering Co. Ltd. In 2014, a specialized cooperative for Vetiver fed beef cattle and black goats was established. Mr. Li, the head of the cooperative, said that 20 ton of fresh Vetiver per mu per year (equivalent to 140 tons/ha/year). Currently, 13 farmer households with 50 Mu (7 ha) of individually owned land make up the cooperative. Together they own 12 calves (4 month old - Fig 1) and 8 cattle (16 month old - Fig 2). Three 13 month old cattle were sold. Vetiver fed beef was favored by consumers due to its fragrant flavor and tenderness. The number of cattle is expected to increase as Vetiver production expands.

The cooperative will operate as a combination of company, cooperative, and farmers. Yunnan Vetiver Sci-Tech Co. Ltd, a branch company of Kunming Guangbao Biotechnology Engineering Co. Ltd becomes a shareholder in the form of technical service, seedling supply, and Vetiver repurchase; the cooperative distributes seedlings to farmers in terms of individual need; and the farmers individually cultivate the Vetiver.



Fig 1 Feeding 4 month old cattle with Vetiver cattle with Vetiver



Fig 2 Feeding 16 month old

Vetiver is intercropped with soft-seed pomegranate trees (Fig 3) as well as pure stand Vetiver gardens (Fig 4) in order to promote fruit free growth and to obtain additional benefits.

Farm experience showed that Vetiver can be planted between April and September in the

local area and rate of survival can be over 90%.



Fig 3 Vetiver intercropped with pomegranate saplings **Fig 4 Vetiver plantation**



Fig 5 A photo taken with the operator **Fig 6 Vetiver root as raw materials for Vetiver products**

Vetiver grown as a perennial forage crop can substantially reduce water and soil loss in hilly area and at the same time improve farm incomes. Farmers growing Vetiver as plant material for sale to companies such as the Kunming Guangbao Biotechnology Engineering Co. Ltd generate a gross revenue of about 4000 Yuan/Mu/year (US \$3500/ha/yr); this revenue can be doubled (US\$7,000) if Vetiver is fed as a forage to livestock. In summary cattle production using forage Vetiver is not only a way of getting out of poverty in the impoverished hilly areas of south China, but also provides the means to protect of the environment through planting such the easy to cultivate and well adapting drought tolerant Vetiver. It is recommended to extend this initiative now, especially in the light of continuing labor shortage in many rural areas.

NOTE FROM Dick Grimshaw. The production data appears to be about correct. Farmers are feeding 140 tons/ha/year of fresh Vetiver. At 12% dry matter, total dry matter = 16.8 tons or 16800 kg/ha/yr = 46 kg/DM/day/ha. A 450 kg cow would consume 13 kg/DM/day (assuming DM consumption at 3% of body weight). 1 ha of Vetiver could support three 450 kg cows – the 7 ha co-op could support 21 such cows.- roughly equivalent to what is currently supported.

The following table and links to further information about the use of Vetiver as a forage is as follows:

Nutritional values of Vetiver, Rhodes & Kikuyu grass in Australia

Analytes	Units	Vetiver grass	Vetiver grass	Vetiver grass	Rhodes	Kikuyu
		Young	Mature	Old	Mature	Mature
Energy (Ruminant)	kCal/kg	522	706	969	563	391
Digestibility	%	51	50	-	44	47
Protein	%	13.1	7.93	6.66	9.89	17.9
Fat	%	3.05	1.30	1.40	1.11	2.56
Calcium	%	0.33	0.24	0.31	0.35	0.33
Magnesium	%	0.19	0.13	0.16	0.13	0.19
Sodium	%	0.12	0.16	0.14	0.16	0.11
Potassium	%	1.51	1.36	1.48	1.61	2.84
Phosphorus	%	0.12	0.06	0.10	0.11	0.43
Iron	mg/kg	186	99	81.40	110	109
Copper	mg/kg	16.5	4.0	10.90	7.23	4.51
Manganese	mg/kg	637	532	348	326	52.4
Zinc	mg/kg	26.5	17.5	27.80	40.3	34.1



THE VETIVER NETWORK (INTERNATIONAL)

http://www.Vetiver.org/NIG-vet_nutrition.pdf

http://www.Vetiver.org/ICV6_PROC/RESEARCH%20AND%20INNOVATION/7%20D%20Lukiwati%20Paper.pdf

http://www.Vetiver.org/ICV3-Proceedings/CHN_digestibility.pdf

<http://www.mekarn.org/procsr/nhan.pdf>

http://www.rangeland.ir/article_510004_110001.html

<http://www.Vetiver.com/NIG-silage.pdf>