

Sweet lupin grain (*Lupinus angustifolius*) **A feed resource for fattening small ruminants in Southwestern Ethiopia**

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Traditional processing practice of whole sweet lupin grain in Doyogena, Southern Ethiopia



Roasted sweet lupin grain used to fatten rams in Doyogena, Southern Ethiopia



Steamed sweet lupin grain for ram feeding in Doyogena, southern Ethiopia

Description

- ✓ Lupines are members of the genus *Lupinus* L. in the legume family (Fabaceae). Taxonomically, lupin belongs to the class of Magnoliophyta Angiospermae, subclass Magnoliatae (Dicotyledoneae) and order Fabales.
- ✓ Sweet lupin (*Lupinus angustifolius*) is used as an alternative source of feed for mid and high-altitude areas of Ethiopia. Locally referred to as “Gibto” in Ethiopia, it is widely used to describe seeds of different domesticated *Lupinus* species.
- ✓ The grain has a high protein content, but the high levels of alkaloids (bitter tasting compounds) makes the grain unpalatable and sometimes toxic to human and livestock.
- ✓ Lupin alkaloids are commonly removed (or reduced) by different processing practices like soaking in water prior to use, dehulling and heat processing.
- ✓ The nutritional content of lupine is influenced by, location management, genetics, processing practice and species.
- ✓ The chemical composition and digestibility of various forms of processed sweet lupin grains are as follows:

Form of processing grain	% DM					
	DM	CP	NDF	ADF	ADL	IVOMD
Roasted and coarsely ground	93.4	36.1	30.2	16.8	1.9	80.6
Whole soaked	93.3	39.3	30.3	14.7	1.1	81.7
Whole steamed	93.1	28.2	38.7	25.3	1.6	72.8

DM: dry matter; CP, crude protein; NDF, neutral detergent fiber; ADF, acid detergent fiber; ADL, acid detergent lignin; IVOMD, *in vitro* organic matter digestibility.

- ✓ An on-farm trial with Doyogena yearling sheep supplemented sheep with 440g/head/day with three forms of processed sweet lupin grains; roasted and coarsely ground, soaked and steamed.

Average daily body weight gain after a 90-days feeding trial was 130g/day, 110g/day and 140g/day respectively against unprocessed grains with 50g/day.

Key benefits

- ✓ The seed and vegetative parts of sweet lupin (*Lupinus angustifolius*) are a rich source of protein and energy. The grain can be fed whole or ground, making it a valuable resource for both monogastric and ruminant production systems
- ✓ Lupines have been successfully identified as an economical alternative plant protein source that is able to be cultivated and fed to animals at a positive profit margin.

Key limitations

- ✗ High alkaloid content
- ✗ Rapid spoilage after processing.
- ✗ Processing practice and formulation is intensive labour and requires good management
- ✗ Requires an optimal balance in a ration

For more information

- ✓ Brenes, A., Slominsky, B. A., Marquardt, R. Guenter, W., Viveros, A. (2003), Effect of enzyme addition on the digestibility's of cell wall polysaccharides and oligosaccharides from whole, dehulled and ethanol-extracted white lupines in chickens Poultry Science, 82:1716-1725
- ✓ Likawent Yeheyis, Claudia Kijora, Firew Tegegne, Kurt J. Peters. (2012). Sweet blue lupin (*Lupinus angustifolius* L.) seed as a substitute for concentrate mix supplement in the diets of yearling washera rams fed on natural pasture hay as basal diet in Ethiopia. Tropical Animal Health and Production, 44:1255–12.
- ✓ Nahom Ephrem., Firew Tegegne, yeshamble Mekuriaw, Likawent Yeheyis, L. (2015). Nutrient intake, digestibility and growth performance of Washera lambs supplemented with graded levels of sweet blue lupin (*Lupinus angustifolius* L.) seed. Small Ruminant Research, 130, 101-107.

Where does this intervention fit?

Potential to overcome feed limitations		Score
▪	In diets which deficient with crude protein such as tropical roughages for ruminant animals	High
	As a substitute for high value proteins such as soybean in monogastric animals	High
	Dairy, fattening, broiler and layer rations	High
Applicability to livestock		Score
Cattle	• Fattening	High
	• Dairy	High
Sheep/ goats	• Breeding	High
	• Fattening	High
Pigs	• Breeding (sows, piglets)	None
	• Fattening	
Chicken	• Broilers	Medium
	• Layers	Medium
Applicability to farming system		Score
•	Mixed crop livestock systems Urban livestock production systems	Low
	Agro-pastoral/extensive mixed systems	Low
•	Intensive mixed crop-livestock system	Very High
•	Landless livestock producers	Medium
Requirement for resources		Score
Requirement of	▪ Land	Medium
	▪ Water	Medium
	▪ Labour	Medium
	▪ Cash/credit	Medium
	▪ Access to inputs	Medium
	▪ Knowledge/skill	Medium

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