NUTRITIVE VALUEOFFALCATA (*Albizziafalcataria*) LEAF MEAL

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Abstract

A study was conducted to determine the nutritive value of falcata leaf meal. A cockerel was used in the study to determine the in vivo digestibility of falcata leaf meal. Results revealed that falcataleaf meal had a high dry matter content, crude protein, and ash. However, it had high crude fiber, low crude fat, calcium and phosphorus content. Its in vivo digestibility was very low which suggests that majority of the nutrients in the leaf meal cannot be utilized by livestock and poultry animals. Furthermore, falcata leaf meal cannot be utilized as an alternative or replacement to conventional proteinaceous feedstuffs.

Keywords: nutritive value, falcata leaf meal, proteinaceous feedstuffs,*in vivo* digestibility

1. Introduction

In several developing countries like the Philippines, escalating cost of protein sources for livestock and poultry feeds is a perennial problem. Increasing importation of soybean meal and fishmeal, the major protein sources, contributes to the financial drain of the country. High cost of these feedstuffs is fast becoming prohibitive for feed millers and animal producers. These led researches to direct efforts and attention in optimizing the potential of non-conventional feeds as protein substitutes.

Plant leaves can be possible sources of protein in feed. Studies on shrubs and leaves showed that on a 90% dry matter basis, their crude protein contents vary from 20 to 30%, crude fiber (CF) from 12 to 18% and xanthophyll from 500 to 600 ppm. Leaf meals are good pigmenting agents due to the presence of different xanthophylls of the general family carotenoids. The most popular among the leaf meals is *Leucaenaleucocephala* (Lam) de Wit, known as "Ipil-ipil" in the Philippines. Leucaena is a rapidly growing leguminous shrub. It is a roughage feed for ruminants and as leaf meal is commonly used as a feed ingredient in poultry and swine diets. However, it contains mimosine, a toxic non-protein amino acid. Mimosine toxicity may be attributed either to its phenolic or alkaloidal property or its inhibiting action on the metabolism of two aromatic amino acids, phenylalanine, and tyrosine.

A type of tree having leaves similar in form and structure to that of a Leucaena is Falcata (*Albizziafalcataria*). Falcata is a type of nitrogenous tree species that is planted on a large scale for pulp and paper manufacture. It can increase soil fertility in acidic areas like grassland and denuded areas since it can fix nitrogen. A newly-harvested/cut mature falcata tree yields at least twenty (20) sacks of fresh leaves. Its leaves are high in protein that can be used to improve soil fertility as well as protein and energy for livestock. This study will be aimed to determine the nutritive value of falcata leaf meal.

Knowledge on the nutritive value of falcata leaf meal will further advance studies on its possible use in feed formulation. It could be tapped as a possible unconventional protein feed source. It could replace part or portion of expensive, imported conventional protein feed sources.

2. Conceptual Framework

With increasing demand for alternative protein sources due to escalating prices of conventional feedstuffs, proteinaceous leaf meals could be tapped. Utilizing tree leaf meals will not cause competition of food for man and animals.

Falcata leaf meal is an untapped potential as an unconventional proteinaceous feedstuff in livestock and poultry. Its leaves could be processed into leaf meal and exploited as a feed resource for livestock and poultry. Knowledge of falcata leaf meal's nutritive value could lead to it being an alternative or replacement to expensive proteinaceous feedstuffs.

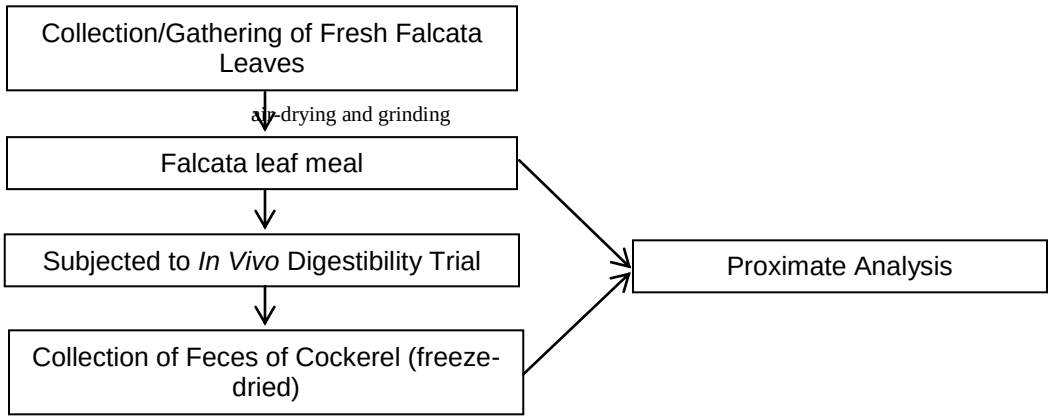

Figure 1.Conceptual framework of the study

3. Materials and Methods

A. Meal Preparation

Fresh falcata leaves including its petioles were gathered from 1-3-year-old falcata trees. The petioles with its fresh leaves intact were then placed on a plastic mat and 'disturbed/hand-stirred' every 3 hours to prevent it from heating that can cause 'browning' of the leaves. After three (3) days, the leaves were separated from its petioles using a wire mesh. The leaves were then placed and air-dried on a 3-mm aluminium-coated wire mesh/screen and 'disturbed/hand-stirred' every six (6) hours to prevent the 'browning' of the leaves. The leaves were ground after its stable air-dried weight has been achieved. The rate of recovery regarding percentage (%) was computed using the formula:

$$RR = \frac{\text{air-dried weight of falcata leaves}}{\text{fresh weight of falcata leaves}} \times 100$$

B. *In Vivo* Digestibility Trial

A single cockerel was used in the trial. A total of 400 grams or fifty (50) grams of falcata leaf meal per day was given to the cockerel for a period of eight (8) days. The first three (3) days was used for adaptability and succeeding five (5) days for data collection. Feces/manure were then collected for chemical analysis. *In vivo* digestibilitywas determined using the formula:

$$\%\ \text{In Vivo Digestibility} = \frac{(\text{amount of feed intake})(\text{nutrient in feed}) - (\text{amount of feces})(\text{nutrient in feces})}{(\text{amount of feed intake})(\text{nutrient in feed})} \times 100$$

C. Chemical Analysis

The collected feces of the cockerel, as well as the feed samples, were submitted to the Regional Feed Analytical Laboratory of the Department of Agriculture – Region X in Cagayan de Oro City for chemical analysis.

Proximate analysis was done using the Standard AOAC Method (AOAC, 1990). Calcium and Phosphorus were analyzed using Electronic Spectrophotometer (ES).

4. Results and Discussion

Rate of Recovery

In this study, the air-dried weight of falcata leaves for every kilogram of fresh leaves is 350 grams. Thus, the rate of recovery of falcata leaves is approximately 35%. This rate of recovery of falcata leaves is better than the rate of recovery of Ipil-Ipil leaves of 28% (3.6 tons green = 1 ton dry at 10% moisture) as cited by Limcangco-Lopez (1993) in her report.

Proximate Analysis

Falcata leaf meal contains high crude protein (CP) content of 23.10%, however, it also contains a very high amount of crude fiber (CF) of about 15.00%. It has a crude fat/ether extract (EE) of 3.5%, 9.69% moisture content, 11.75% ash, 0.72% calcium (Ca), and 0.06% phosphorus (P) (Table 1).

Table 1. Proximate analysis and *in vivo* digestibility of Falcata (*Albizziafalcataria*) leaf meal

NUTRIENT	PROXIMATE ANALYSIS	*IN VIVO* DIGESTIBILITY
Dry Matter, %	90.31	19.13
Crude Protein, %	23.10	26.13
Crude Fiber, %	15.00	38.00
Crude Fat, %	3.50	18.67
Moisture, %	9.69	-
Ash, %	11.75	-
Calcium, %	0.72	19.13
Phosphorus, %	0.06	19.13

[1]Regional Feed Analytical Laboratory, Department of Agriculture, Cagayan de Oro City

In Vivo Digestibility

In vivo nutrient digestibility (%) is equal to the feed intake times the nutrient in feed minus the amount of feces times the nutrient in feces all over the feed intake times the nutrient in feed multiplied by 100 and in the case of falcata leaf meal it is very low as shown in Table 1.

Dry matter digestibility of falcata leaf meal is only 19.13%, only 26.13% of the crude protein is digestible, 38.00% crude fiber digestibility, 18.67% crude fat, and 19.13% digestibility for both calcium (Ca) and phosphorus (P).Low dry matter digestibility of nutrients in falcata leaf meal could be attributed to its high fiber content. Monogastric animals will find it hard to extract nutrients from high fiber feedstuffs.

Another reason for the low dry matter digestibility of falcata leaf meal could be attributed to the presence of condensed tannins in tree leaves. Addition of condensed tannins to diets of experimental animals usually results in diminished weight gains and lowered efficiency of feed utilization, as well as increased fecal nitrogen. These effects have been interpreted in terms of inhibition by tannin of the digestion of dietary protein (Butler, 1989).Likewise, Goldstein and Swain (1965) reported that tannins inhibit the activity of many different enzymes.Mole and Waterman (1987) supplemented that these enzymes act on polymeric substrates such as proteins,

carbohydrates and nucleic acids. Tannins could intervene by binding to either the enzyme (e.g. trypsin) or thesubstrate (e.g. leaf protein) or to both.

5. Conclusion

Falcata leaf meal used in this study had a high dry matter content, crude protein, and ash. However, it had high crude fiber, low crude fat, calcium and phosphorus content. Its *in vivo* digestibility was very low which suggests that majority of the nutrients in the leaf meal cannot be utilized by livestock and poultry animals.Furthermore, falcata leaf meal cannot be utilized as an alternative or replacement to conventional proteinaceous feedstuffs.

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