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Original Research Article

Sunflower is a Good Source of Animal Feed

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A B S T R A C T

Sunflower meal (SFM) has the potential to be a major feed ingredient for poultry in many countries not suitable for extensive soyabean cultivation. SFM is a good source of protein with amino acid availabilities similar to those of soyabean meal (SBM), and much higher than those in cottonseed or rapeseed meals. Its lysine content is relatively low but this can be resolved with supplemental lysine. Fibre content should be decreased to a minimum by dehulling during processing of the sunflower seed for oil extraction. Fibre < 12%) can still cause bulky feed at higher inclusion rates (< 30%), and as a result dietary nutrient dilution (particularly in broiler diets) may occur. Nevertheless, pelleting the diet can help overcome the bulkiness and thereby lead to improved growth and feed efficiency. Another characteristic of SFM is that it does not have anti-nutritional factors such as those found in soyabean, cottonseed and rapeseed meals. Enzyme supplementation to SFM-based diets in different types of poultry species need further study. The ingredient can successfully be included in layer, broiler and waterfowl diets to replace 50–100% of soybean meal, depending on the type of diet and the nature of the other ingredients

Keywords

Sunflower meal (SFM), Animal Feed

Introduction

Sunflower meal is obtained by crushing its seeds for oil and oilcake which is further sent for extraction to obtain remaining oil and its meal. Sunflower seed is popular as bird seeds. But with the growth in consumption of sunflower oil, it is mainly crushed for obtaining edible oil so the production of meal too is good enough to create local and some international demand. Sunflower meal is widely used as protein material for animal feed. Meal contains about 30% crude protein with 30% fibre. It is superior to most vegetable proteins in digestibility.

Sunflower seed extractions are widely used as protein material for animal feed. Indian sunflower seed extractions contain about 30% crude protein with 30% fibre. Although sunflower protein is low in lysine, methionime & cystine levels are favourable to meet poultry feed requirements. It is superior to most vegetable proteins in digestibility. Recent development of various enzyme preparations, which can act upon fibre in sunflower meal, making it more digestible, can result in an economical substitute for various protein sources. Thus it can be used at higher levels in the poultry feed.

3 Kinds of Sunflower Oil Meal

- Meal produced from undehulled seeds, containing around 28% protein and 25%-28% fiber.

- Meal produced from partially de-hulled seeds, containing 35%-37% protein and 18% fiber;
- Meal produced from seeds with 2-step de-hulling process, containing 40%-42% protein and 12%-14% fiber.

The meal composition thus depends on the efficiency of the de-hulling, and the oil content of sunflower meals ranges from 1.5% to 2.5%, depending on oil extraction efficiency and raw materials. Fresh sunflower meal must be dried for optimal storage. It can be ground, broken into small pieces or pelletized for easy handling and storage by processing under high pressure in an pelletizer or extruder, with an addition of proper binder such as molasses, fats, etc.

Materials and Methods

The procedure for the collection of data was through in-depth interviews and discussions, information analysed was mainly based on the records available from the following sources----

1. Directorate
2. Poultry farms
3. Brokers
4. Govt Department
5. Poultry Hatcheries

Results and Discussion

Sunflower meal market is highly competitive market, as many industries are involved in the business. The financial position of farmers is also poor .The farmer is unable to purchase the sunflower meal against cash and want to buy on credit. Climatic factor is one of the important factors affecting the sale of sunflower meal .Higher price of sunflower meal leads to switching to other ingredients by the farmer.

Recommendation and directions for future research

Dehulling before processing

Sunflower seeds from oil types contain about 20-30% hulls, which are often removed before oil extraction. This is because of their deleterious effects on oil presses: they hinder lower oil extraction and reduce the quality of both oil and meal (Kartika, 2005). Reducing the hull content by 1% improves pressing capacity by 2.5%. A well-managed dehulling process yields seeds with 8-12% hulls remaining on the kernels (Campbell, 1983). Dehulling is done after cleaning the seeds and drying them down to 5% moisture, which facilitates kernel-hull separation (Kartika, 2005). The usual process consists in cracking the seeds by the mechanical action of centrifugal or pneumatic shellers. It can also be done by abrasion (Carré, 2009). The resulting blend is winnowed to separate the hulls from the kernels. Some sunflower varieties have thinner hulls that are more difficult to remove. In this case, dehulling is not recommended as it may result in oil loss, and increases extraction costs without enhancing oil and sunflower meal quality (Grompone, 2005; Campbell, 1983).

Oil extraction

Once winnowed, the kernels undergo mechanical pressing through screw-presses (expellers), resulting in a "cake" containing 15-20% of oil. This cake can subsequently be extracted with a solvent (usually hexane) to yield more oil. While pressing followed by solvent extraction is the most common industrial process, mechanical extraction is used by producers of specialty oils and smallholder farmers in both developed and developing countries (for example in Zimbabwe; Mandibaya et al., 1999). In the European Union, regulations forbid the use of solvents for the production of feed ingredients used in organic farming (European Commission, 2007), so only

mechanically-extracted sunflower meals can be used for organic animal production.

Conditioning

Fresh sunflower meal must be dried for optimal storage. It can be ground, broken into small pieces or pelletized, for easier handling and storage by adding a suitable binder such as molasses or fats under high pressure in a pelletizer or extruder (Grompone, 2005).

Quality

Solvent extraction results in a lower fat content, while dehulling decreases the fibre content, yielding a meal richer in protein. There are fully decorticated meals (high protein, low fibre), partially decorticated meals and non-decorticated meals (low protein, high fibre) with no clear separation between these grades. Like other protein feeds such as fish meal or soybean meal, sunflower meal is usually graded and sold on the basis of its protein content, for example "28", "29", "37", etc. In the USA, protein level and process of manufacture must be mentioned in order to inform users about the quality of the sunflower meal (NCPA, 2008). The colour of sunflower meal ranges from grey to black depending on the degree of dehulling (meals with less hulls are lighter) and on the extraction process (Naidu, 2008).

Though it contains less protein and much more fibre than soybean meal, sunflower meal is a valuable livestock feed, particularly for ruminants and rabbits, and under certain conditions for pigs and poultry.

Comparison with other oilseed meal

Item	Sunflower	Soybean	Canola	Cottonseed
Crude Protein	32%	47%	36%	41%
Fat	1%	1.5%	3.5%	1.50%
Fiber	21%	3.1%	12%	11.0%
Ash	6%	6.4%	6.8%	6.30%
Lysine	1.14%	2.99%	1.93%	1.72%
Arginine	2.46%	3.4%	2.21%	4.55%
Cystine	0.55%	0.73%	0.89%	0.70%
Valine	1.75%	2.26%	1.91%	1.78%
Isoleucine	1.38%	2.10%	1.41%	1.23%
Methionine	0.68%	0.68%	0.73%	0.67%
Threonine	1.13%	1.85%	1.54%	1.36%
Tryptophan	0.65%	0.65%	0.48%	0.48%

Treatment of sunflower meal by enzyme

There is potential for the improvement of the quality of the sunflower meal by the enzyme treatment .Sunflower meal contains high quality proteins but its use in diets of animals has been limited by the relatively high levels of fibers ,resulting in low energy yields and less than optimum protein utilization .The fiber content of sunflower meal includes lignin with associated polyphones(8%),cellulose (4-6%) and non-cellulosic polysaccharides (13-16%),which consists predominantly pectic substances.

Other important components includes oligosaccharides (2-5%),glycoprotein (5% i.e. arabinogalactanprotein, cell wall protein) phytates (3.3%),minerals associated with the fiber fraction (%) and gums(4%).These componenets total 35-40% of the meal and undergo limited substrates available for absorption as demonstrated by less than optimum digestibility values for the constituents ,protein (70-75%), dietary fiber (3-8%) , oligosaccharides (60%), phytates (47%), gums(60%).These components can be degraded by exogenous enzymes of microbial or fungal origin ,thereby improving the nutritive worth of sunflower meal following supplementation of poultry diets with a combination carbohydrase ,protease and phytase enzymes. Dietary addition of enzymes will be of practical importance in improving the feeding value of low energy feeds of poultry, as stated by Nasi (1989) "Enzyme supplementation could be used to breakdown antinutritional substances found in raw feed materials, thus augmenting the digestive capacity of the animal improving availability of nutrients in the feed .Work has shown that enzymes release significant amount of extra nutrients from feeds. This warrants development of new nutritional standards. An apparent energy value can be ascribed to enzyme products. There is also amino acids sparing effect and digestible lysine and methionine can be reduced by as much as 5%.Thus enzymes prove to be a good feed additive .Enzymes will play a prominent role in the future.

In conclusion, sunflower meal faces competition from soybean meal. Sunflower meal can be safely included up to 20% level in cattle ration. The use of high fibre sunflower cakes (undecorticated) is restricted to the feeding of adult ruminants, whereas, the decorticated cake is a digestible high-protein feed that can be used freely for all livestock. As the cakes are hard, they are best fed ground and incorporated in compound cattle feeds. Sunflower meal can be used as the sole source of protein to feed animals.

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