

ALTERNATIVE FEED INGREDIENTS FOR SUSTAINABLE LIVESTOCK PRODUCTION

Abstract

For a number of reasons, including the rising cost of commercial feed and the need for agricultural sustainability, it is increasingly important to employ alternative food sources as animal feed. Farmers are facing rising production costs as the price of commercial feed continues to rise. This might cut into their bottom line and make it tougher for them to compete with more established firms. Farmers can save money on feed by using alternative sources, such as food waste or crop byproducts, which can be obtained at little to no cost.

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I. INTRODUCTION

Increasing global demand for animal products (including meat, eggs, dairy products, and fish) can be attributed to several factors, including a larger global population, more people living in metropolitan areas, and higher average incomes. The challenge lies in finding sustainable solutions to meet this rising demand on a global scale, keeping in mind the scarcity of resources and the desire to reduce environmental impact. The production of animal feed is a significant source of the environmental impact of animal products. This is so not only because of what happens on the farms where the animals are reared, but also because of the manufacture, shipping, and processing of the components. Therefore, it is crucial to pay special attention to the ingredients used in animal feed. This page defines "sustainable" as it relates to feed ingredients, and it goes on to explore the initiatives now underway in the global feed business to promote the use of sustainable ingredients. In addition, rendered products are receiving extra attention because of the increased pressure to provide evidence that they meet criteria for sustainable ingredients. This article describes the advantages of using rendered goods in sustainable animal production and the advantages of marketing sustainable rendered products.

II. SUSTAINABLE FEED INGREDIENTS: DEFINING THE TERM

Because of the intricacies involved, there is no consensus on how to really implement sustainability and sustainable development. There is no single, all-encompassing set of sustainability standards and indicators because sustainability is defined by (individual) perceptions, backgrounds, interests, and advances in people and their environment. Because of this, it is difficult to establish sustainable feed ingredients. To tackle this problem and incorporate the viewpoints of different interest groups into the process of making sustainability operational, multi-stakeholder platforms have been established to establish principles and criteria that production will have to meet in order to be labelled responsible. Sustainability in all its forms (economic, social, and environmental) is taken into account while deciding on the criteria. For the region as a whole to benefit economically from the production of feed ingredients, it must not be harmed in any way by this activity, and the benefits must be divided fairly among the local population. Social sustainability is concerned with the welfare of local employees and people and encompasses issues such as working conditions, human rights, property and licence rights, social conditions, integrity and competition in food, local energy supplies, pharmaceuticals, and building materials. There are other factors to think about, such as culture and identity, diet, food security, and human health. Ecological sustainability depends on a number of factors, including greenhouse gas emissions, biodiversity, eutrophication, acidification, land use changes, depletion of precious natural resources, and energy usage. The amount and quality of both groundwater and surface water, as well as the management of waste and the use of agricultural chemicals, are further requirements.

III. DIFFERENT ALTERNATIVE FOOD SOURCES

- 1. Green Feed, Hay, Meal, Silage, and Straw (Canola):** Canola's adaptability as a green feed, hay, meal, and silage gives farmers a lot of options when it comes to feeding their animals. If collected in the late bloom or early pod stage, it can rival the quality of alfalfa/grass hay in terms of total digestible nutrients (TDN), which can reach as high as

60%. It may be difficult to cure and bale crops with a high moisture content. Protein (36%), energy (68% TDN), and essential amino acids are particularly abundant in canola meal, a by product of oil extraction. Canola straw has essentially no use as a feed because it contains less than 4% crude protein and 20% TDN.

- **Benefits:** Livestock farmers have access to a variety of canola products, including hay, green feed, meal, and screenings. Canola manufacturing by-products can be used as feeds, and they contain high levels of crude protein and calories. Because of the vast acreage under cultivation, researchers have begun examining the usefulness of canola by-products in animal food.
 - **Drawbacks:** Cattle may need a few days to adjust to canola's taste. Canola is commonly fertilised to boost yield, which means it may have more nitrates and sulphur than is ideal. When the oil content is above 7%, it can impair rumen function, leading to decreased voluntary intake. Nitrate accumulation is one outcome of drought stress in canola, making green canola re growth toxic to cattle. The high sulphur content of canola has been associated to PEM.
 - **Ideal for:** Any and all cattle breeds.
2. **Chaff:** Chaff can be placed in mounds on the field after being spread over straw swaths or collected in a chaff waggon that is towed behind the combine. Light and fibrous chaff is a low-protein, low-energy feed option. Cereal chaff has a crude protein value of roughly 4%, while chaff made from lentils and peas has a composition of over 9%. Cereals and legumes both have low total daily nutrients (TDNs) in the 30-50% range. It will be required to take nutritional supplements. Chaff can originate from the combine itself, the crop being harvested, the weather, and other environmental factors. Feed studies can reveal the extent to which extra nutrients and calories are required.
- **Benefits:** Once the chaff heaps have been emptied, they can be used as feed in the field. It's a terrific way to increase the fibre content of your meals. It has been shown that certain combines produce chaff with slightly higher feed value because they allow slightly more grain, seed, and hull leftovers through.
 - **Drawbacks:** Due to its bulk, moving chaff from the field to a feed yard where it may be stored is a time-consuming and costly process. Neither energy nor protein are well served by this method. Equipment designed specifically for collecting chaff is necessary.
 - **Ideal for:** Completely fed bovines of reproductive age. Farmers can get more out of their feed supply if they give chaff to their cows, however this may be more beneficial for mature cows than growing ones.
3. **Produced Garbage, Section:** The leftover bits of crops after harvest are a great source of nutrition for animals. Grazing residues include things like fresh growth, shelled grains, and stubble. Stover from field pea and maize can be baled if there is enough of it. Cost-effectively utilising a potential feed source left in the field, electric fences allow cattle to be put out to graze agricultural residues after harvest. Cereal crop byproducts contain a low crude protein level (3%-4%), high fibre content, and poor digestion. Protein in the residue can be increased by grazing the unharvested pods or shelled beans of soybeans or lentils. Re grown grains or pulses can be processed back into high-quality feed. Pulses tend to be harvested before cereals, so there may be significant re growth before the

ground freezes. The protein and calorie composition of these feeds might vary widely from one brand to the next.

- 4. Dried Distilling Grains, Distilling Grain:** Farmers who are located in close proximity to ethanol distilleries can save money by switching to distillers' grains, dried distillers' grains, distillers' grains with solubles (DGS), or dried distillers' grains with solubles (DDGS). Cereal grains like corn, wheat and sorghum are heated and fermented to produce biofuels. After the starch has been converted and extracted, what is left is distillers' grains, the solid residue, and thin stillage, the liquid fraction. This mixture can be used to create either wet distillers' grains (WDG) or dry distillers' grains (DDG). By combining DGS with concentrated thin stillage and drying the resulting mixture, we get DDGS, or dried distillers' grains with solubles.

Depending on the grains used and the processing method, distillers' grains can be a very high or very low supply of protein (25-40%), a moderate quantity of digestible fibre (22-48%), a moderate source of fat (3-11%), and a high source of total digestible energy (80-90%)⁶.

- **Benefits:** Delicious distillers' grains help stimulate the rumen. They are an inexpensive way to increase the protein content of feeds used in feedlots, and they can improve both growth rate and feed efficiency. The expansion of the grain-ethanol industry in North America has increased the availability of grain for use as animal feed.
 - **Drawbacks:** As the feed is large whether it is wet or dry, the economics of utilising distillers' grains are decided by their proximity to processing companies. Some of the feed's value may be lost during the drying process. Since silage has a high water content, wet distillers' grains may not be a good fit for these kinds of diets. Food should only be stored for no more than two days because of the increased rate of spoiling induced by the summer heat. Before ensiling, a mixture can be improved for long-term preservation by adding dry materials like oat hulls or soy hulls. It's necessary to test feed before using it because nutrient content can vary across batches or loads. This data sheet explores the notion that DDGS's high sulphur content increases the prevalence of polio encephalomalacia (PEM) in calves fed a diet consisting of more than 40% DDGS. While distillers' grains do contain some fibre, the fibre particles are too small to offer the "scratch factor" needed to stimulate rumen function. Distillers' grains are more suitable as a concentrate element than as a roughage replacement like silage.
 - **Ideal for:** Cattle, in general, and cattle raised in feedlots, in particular.
- 5. Grains, Legumes, and Pulses (Green Feed):** Growing oats, barley, or durum from seed, then harvesting and baling the grain, yields green feed. The amount of nutrients and proteins present are modified by the time of harvest. Late-picked green feed often has lower protein levels (about 8%), higher energy (approximately 61% TDN), and higher yields since it is harvested during the milk, soft dough, or firm dough stages. Protein content in green feed, such as hay derived from legumes, peas, and beans, can range from 14% to 14%, while calorie content can range from 56% to 56%, making it a relatively inexpensive feed option. Green feed, often comprised of immature lentils and peas, is nutritionally equivalent to lucerne. After the crop has been swathed, its quality will

fluctuate as it reaches various stages of maturity and pod development and as a result of other meteorological events.

The meal should be tested for mycotoxins, nitrates, and mould growth, and further testing may be considered. Although some farmers intentionally plant it as part of their feed strategy, green feed is an alternative feed that becomes available to resourceful livestock farmers after weather disasters like hailstorms. Farmers who have had their cash crops damaged may be willing to sell their harvest early to avoid the costs and hassles of spraying or tilling under the crop.

- **Benefits:** Green feed's nutritional value exceeds that of straw yet its price is lower than that of hay. The equipment and space requirements for harvesting and storing are the same as those for storing other baled forages. Bales can be rolled out, fed using bale feeders, or processed, so feeding options are flexible.
 - **Drawbacks:** Damage from hail, illness and mould after swathing, and the need for extra drying time can all make harvesting a crop challenging. Nitrate build up can occur when cereal crops are harvested after a weather event like hail or drought. Cereal-based green feed is sometimes too high in potassium and too low in magnesium and calcium. The ratio of calcium to phosphorus in the meals should be monitored and the blend of minerals might be 2:1 or 3:1. Green feed crops, such as lentils, peas, and soybeans, require longer to dry out than other forages because of the pods and vegetative elements. The quality is different depending on the stage of development the pod is at.
 - **Ideal for:** Any and all cattle breeds.
6. **Make Use of Factory Waste:** Produce that is deemed subpar by the food business is referred to as "cull," and this high-volume, high-moisture byproduct can be utilised to supplement cattle diets. The high energy and variable nature of these items necessitates careful management and supplementation to achieve nutritional parity in feeding programmes. Due to their high moisture content, the foods must be consumed quickly or ensiled to prevent spoilage or freezing. Availability is inconsistent and supply varies by region. Since cull potatoes, which are abundant in some regions, contain a high concentration of carbohydrates in their feed, they can be utilised as a grain substitute in these regions. Potatoes don't include any of the healthy nutrients—like fibre, protein, vitamins, and minerals—that the human body needs to function properly. New Brunswick alone produces enough cull potatoes to fill a 135 million metric tonne annual demand.
- **Benefits:** Depending on the pricing and the shipping cost, using food scraps and processing by-products to increase the ration's energy content can be an affordable way to do so. Using these products reduces their negative effects on the environment.
 - **Drawbacks:** The high cost of transporting the feed is due to its bulky dimensions. Storage and handling require extra caution. Some crops and by-products may need to be processed or broken up so that cattle don't choke on them. Some folks may not like the flavour. To avoid this, try incorporating more fruits and vegetables into your diet gradually and in small amounts. The ration needs to include sufficient protein and fibre.
 - **Ideal for:** We dry cows, wean calves, and wean calves.

Oat Bran, 3.60 Scones: In the same vein as cereal straw, oat hulls (a byproduct of the oat processing industry) provide a wealth of beneficial elements. They're tough to digest due to their high fibre content and low protein content. Grinding the product before shipping might increase its density, but it may also create additional dust. By mixing oat hulls with better quality pasture feeds, farmers are able to stretch their feed budgets farther.

- **Benefits:** Oat hulls can be a low-cost roughage choice if the distances and costs involved are minimal.
- **Drawbacks:** Oat hulls are heavy and bulky, making transportation costly. They are dusty and lack significant nutritional value.
- **Ideal for:** When used with a moist feed supply, feeders can control dust in the diet.

7. Grain, Oilseed, and Pulse Testing: Cleaning services for grains before they are shipped to customers often generate screenings as a by-product. These screenings may contain broken grains, chaff, and dockage like as pods or fibrous debris. Grain screening pellets (GSP) are made from grain screens, which are purchased by feed companies. The pelleted product is more expensive, but it assures more consistency from load to load. Producers can save money on pelleted goods by buying screens directly from grain enterprises and processors and having them shipped to their facilities, provided the shipping costs are affordable.

Energy from grain screenings ranges from 60% to 70% TDN, and protein from 12-14% CP, whereas canola screenings can yield as much as 90% TDN and 15% CP. TDN can be increased by 75% and protein by 20% when bean screenings are added to a low-cost straw or low-quality forage meal. According to the findings of a comparison study, wheat screens can effectively replace barley grain in feedlots. Feedlots can save money when wheat screens are cheaper than barley grain.

- **Benefits:** You can get all the protein and carbs you need at screenings, and they won't break the bank. They can be kept at room temperature without any special care. Screens typically don't need additional processing like rolling or grinding because the grains in them are already broken and fragmented.
- **Drawbacks:** Due to load fluctuation and consistency, testing feed is required to determine feed value. The danger might spread if cattle were allowed to graze in places where screenings had been dumped. Due to the increased risk of acidosis when particle size is very fine, screens should make up no more than 50% of growing meals and no more than 25%-30% of completing diets. In cereal screens, ergot thrives in the chilly, moist conditions of spring and summer and poses a significant risk that must be mitigated.
- **Ideal for:** Any and all cattle breeds.

8. Soybean Meal and Hulls: The extraction of soybean oil results in the byproducts of soybean hulls and soybean meal. Because of their bulk and dustiness, hulls are often crushed down to a lower particle size before shipping so that they can supply about 12% crude protein, up to 80% TDN of energy, and highly digestible fibre to the diet. Hulls have high calcium levels and low phosphorus levels, respectively. Since soybean hulls are so quickly digested, they cannot serve as the primary source of fibre in the diet. Grass and hay are highly palatable to livestock, which can speed up their growth rate.

Ground to improve digestibility, soymeal has high levels of protein and calories (up to 49% CP and 84% TDN, respectively).

- **Benefits:** Delicious energy from soybean husks, but soymeal has greater protein. Both are effective and cheap ways to add energy to meals.
- **Drawbacks:** The bulkiness of soybean hulls and meal may increase shipping and storage costs. The nutritional value of different foods varies greatly. Use soymeal quickly after grinding; after three weeks, it becomes rancid and can grow mould.
- **Ideal for:** Any and all cattle breeds.

9. Sprouting and Cooked Cereals: Wet circumstances and weather concerns during harvest could cause high moisture or "tough" grains. The potential for these grains to be destroyed by heat or sprout during long-term storage adds a further layer of difficulty. If these grains are deemed unfit for human consumption, their producers may be able to buy them at a lower price. Several studies have found that feeding cattle sprouted grains has no discernible effect on their nutritional value, ADG, feed to gain ratios, or carcass characteristics. Moreover, the concentration effect that occurs during germination often results in greater nutrient levels in sprouted grains. Vitamins A, D, E, K, and thiamine, as well as the risk of moulds and germs, are all susceptible to loss when grains are heated. It is important to verify the safety of cooked grains for animal consumption before feeding them.

- **Benefits:** The outcomes of utilising sprouted or heated grains as feed are same to those of using conventional feed grains. When gradually introducing new foods to animals, keep an eye out for signs of acidity or gastrointestinal upset. Often, it is more cost-effective to purchase heated or sprouted grains rather than feed grains.
- **Drawbacks:** Due to their high moisture content and spoilage risk, these grains are difficult to store. The ideal relative humidity for storing grain is between 13% and 14%. Sprouted grains often have a moisture level higher than 16%. Aeration bins can be used to lower the moisture content and speed up the drying process of these grains. Bags and silos are also viable alternatives to airtight containers. Moulds and mycotoxins, such as ergot or vomitoxin, are more likely to grow on grain that has been exposed to too much moisture or has sprouted, and they can cause poor animal performance, fertility abnormalities, and abortions. To ensure the feed is safe for the cattle to consume, it must be tested for mould and mycotoxins. Another possible problem is the product's dependability.
- **Ideal for:** Dry cows and yearlings and feeders of all ages.
- **Watch Out for:** Groups comprising mother and child, expectant mothers, and bred females.

10. Straw: Straw can be fed to beef cattle instead of more expensive feed. Producers have reported average feed test results for cereal straw (which includes barley, oat, and wheat) of 4% CP and 45% TDN. Legume straw has a greater protein content (7-8% CP) and comparable total digestible nutrients (TDN) to cereal straw. Supplemental protein and energy is necessary because this diet is insufficient for calves, yearlings, and lactating cows.

While most crop straw waste is dispersed across the field by contemporary combines, it is still possible to drop, windrow and bag the straw after cash crops are harvested. Cash crop growers may be ready to sell straw to cow farmers in the wake of natural calamities like hail or drought.

- **Benefits:** Straw is commonly inexpensive. Farms and ranches that use a combination of the two are able to bale crop residue. Farmers and ranchers can put it to either nutritional or bedding usage.
- **Drawbacks:** Straw has a lot of fibre, but not much else to offer nutritionally. If their nutritional demands aren't addressed, cattle may become impacted from consuming too much straw. Straw may not provide enough nutrition for cattle, thus it may be essential to supplement their diet with grain, pellets, or other feed.
- **Ideal for:** cattle that are mature and dry on a diet of straw supplemented with protein and energy. Due to its low caloric and protein content, it is unfit as a primary feed source, especially as winter approaches and cattle need more calories to stay warm.
- **Watch Out for:** These include bovines in their second or third trimester of pregnancy, nursing mothers, calves, and bred heifers. Straw can be part of a healthy diet, but it needs to be complemented with something else to provide the necessary nutrients. In the left image, lentil straw is rolled out and fed as part of an alternative feeding schedule. The Cow Bytes programme found that the optimum approach to meet the protein, energy, fibre, and mineral demands of the cattle was to provide the green feed of oat/pea bales, lentil straw bales, and some screens, in addition to access to native pasture. The right side of the image demonstrates that the animals have completely cleaned and consumed the feed. Photographed by T. Carter.

11. Sugar Beet Byproducts : Pulp, Tops and Tailings: Sugarbeets can be utilised in their whole, from pulp to tops, as animal feed. TDN levels in whole beets can reach 81%, while pulp levels can reach at least 70%, making them a superb energy source. Tops and tailings had a TDN content of 50–65%, respectively. Beet by-products only provide 6-9% protein, so it's necessary to supplement the ration with another source of protein. Sugarbeet pulp, a byproduct of sugar processing, can be utilised as a feed source in place of starch due to the high concentration of digestible fibre it contains. Sugarbeet pulp can be ensiled, encased in plastic, or stored in a bag to eliminate the need for oxygen and prevent spoilage. It can then be added to a ration, fed in bunks, or used as a supplement on pasture to reduce fodder intake. While beets in their entirety can be stored in a pile over the winter, they will rot if not eaten before the temperatures rise. When ensiling is used in conjunction with dry materials like straw or hay, long-term storage is possible.

- **Benefits:** The nutritional composition of sugarbeet pulp is similar to that of corn silage, making it suitable for use in backgrounding and finishing diets.
- **Drawbacks:** Shipping pulp and complete sugarbeets from distance might be costly due to their bulk. It may take more effort to appropriately stockpile, mix, and process these materials. Beets, if fed whole to calves, provide a choking threat and should be processed or split up before being fed. Very little beetroot tops should be given to avoid scouring and potential liver or kidney damage. Sugarbeets and beet pulp can help reduce acidosis if they are introduced to the diet slowly, without over feeding.
- **Ideal for:** Stabling, finishing, and drying cattle.

12. Version of Yellow feed: "Yellow feed" is a by product made when annual cereal crops like barley or oats are treated with glyphosate and allowed to dry while still standing in the field. Once dried, it can be utilised as feed after being chopped, baled, and bundled. Growers often spray the crop for green feed five days before harvest. After the crop matures for a few days and then dries out, the yield increases marginally. The harvest is available for swathing and baling after 15-21 days of drying. Oats are best sprayed after they have reached the milk-dough stage, while barley is best sprayed when it has reached the soft-dough stage. Barley needs four to seven fewer days than oats need to dry. Crude protein and calorie content may vary.

- **Benefits:** Since it takes less time to spray, chop, and bale, yellowfeed can be used as a palatable substitute for greenfeed. None of the leaves or kernels were affected. Windrow losses from weathering can be minimised, allowing for speedy baling after swathing. Crop farmers who have suffered a loss due to drought or hail may find this enticing because of the additional benefit of eliminating perennial weeds. Despite adverse conditions, farmers can still spray, chop, and bale good feed in a shorter amount of time.
- **Drawbacks:** Supplements may be necessary depending on your individual protein and energy needs. Because glyphosate prevents grass from growing back, it can't be used for autumn grazing. You'll need to purchase in specialised equipment or pay for expert swathing services if you plan on mowing yellowfeed with a mower conditioner, as doing so can shatter the dried leaves and stems.
- **Ideal for:** Any and all cattle breeds.

13. Weeds: Maximising feed value and ensuring palatability requires early mowing and baling of weeds. For instance, kochia is edible and has as much protein as 20% of lucerne when collected young, before it flowers. However, the high concentration of mineral salts in it renders it laxative for livestock. While the feed value of young cattails is poor (about equivalent to that of straw), they can be used as a supplement.

- **Benefits:** Preventing weeds from going to seed by cutting and baling is an effective method of weed control, especially for kochia that is resistant to glyphosate. Some farmers may be willing to let livestock farmers clear their fields of weeds by cutting and baling the vegetation. Cutting and baling cattails to remove a slough before cultivating or disking it down for a new crop may be worthwhile to some cash crop producers. Weeds and cattails can be purchased for very little money. Comparable costs to store and transport other cut and bale feedstuffs should be expected.
- **Drawbacks:** If the cattle are fed in an area where weeds have been permitted to develop seed before being cut and baled, the weeds will disperse their seeds all over the area. Make sure the weeds you intend to utilise as feed have not set seed before baling them. Many weeds can be dangerous to cattle because to the nitrates they accumulate. Kochia contains oxalates, which are toxic to the liver and kidneys. Cattails, which contain around 6% protein when young, are of no use as feed because cattle do not find them tasty until they reach maturity.
- **Ideal for:** 1 year old cows who are mature and have dried out. In the table below, you can see how several alternative feeds stack up nutritionally. The results should be used as a general guideline, rather than as a representation of specific samples, because of the wide range of possible variations among alternate feeds. Before incorporating new

feeds into a routine, producers should make sure they are safe and provide adequate nutrition.

IV. INITIATIVES TO IMPROVE THE WORLDWIDE SUPPLY CHAIN FOR ANIMAL FEED

There are two primary strategies that players in the feed chain have employed so far. There have been both efforts to standardise processes and establish multi-stakeholder forums to define guidelines for ethical manufacturing. Efforts to expand data availability and assess data quality fall under the latter category. Both the Roundtable on Responsible Soy (RTRS) and the Roundtable on Sustainable Palm Oil (RSPO) have been the most prominent global multi-stakeholder forums for feed ingredients. Industries or trade organisations generally collaborate with other stakeholders before developing standards and certification programmes for feed ingredients. The International Fish Food Chain Organisation RS Global Standard for the Responsible Supply of Fishmeal and Fish Oil is one such approach. Many business initiatives, some of which involve government and non-governmental organisations, are currently working to achieve methodological consistency. The most promising development is the ongoing effort to create a guideline for conducting feed life cycle assessments. The American Feed Industry Association (AFIA) and the European Feed Manufacturers' Federation (FEFAC) have been collaborating on an Environmental Footprint Reduction Guideline since 2011. Standards and recommendations from organisations all over the world, such as ISO 14044 on LCA and the European Commission's Product Environmental Footprint Guide, are taken into account. Another effort with a similar goal is the EU Food Sustainable Consumption and Production Round Table, which in November 2012 published the drafted ENVIFOOD Protocol. This protocol is meant to serve as a set of recommendations for measuring the environmental performance of food and feed products. The document specifies the requirements for assessing the environmental impacts of food and drink throughout their whole production and consumption processes. - The Feed Print programme in the Netherlands. The Feed Print effort was initiated in 2009 by the Dutch Product Board Animal Feed (PDV) to develop a set of methodological recommendations and a ready-to-use instrument for assessing greenhouse gas (GHG) emissions from feed and feed additives. In order to create a global feed LCA standard, the Feed LCA Guideline is being used as a starting point. FEFAC and AFIA have contributed to the United Nations' Food and Agriculture Organization's (FAO) Livestock Environmental Assessment and Performance Partnership (LEAP). FEFAC and AFIA have been involved with LEAP, which is run by the International Feed Industry Federation (IFIF), since its start in 2012. There will likely be extensive use of the Feed LCA Guideline in forthcoming Product Category Rules (PCR). The latter is a cornerstone of the European Commission's approach to sustainable production. Every sector of the food and feed industries has been requested to help create PCRs. Work is being done in many different areas. However, it appears that the first to publish can set the scene, even though these PCRs should be created in collaboration with important stakeholders to prevent overlaps and to connect sectors (for example, the feed industry should contact the rendering industry as a supplier).

V. CONCLUSION

Livestock farmers are continuously looking for ways to save costs without jeopardising the health of their animals. One method to do this is to get feeds from other, nearby sources. The quality and availability of substitute foods might vary widely from one region to another.

Careful management of alternative feeds is required to guarantee that cattle receive adequate nutrition. In order to reach nutritional parity, it may be necessary to increase the amount of protein, calories, or fibre in the feed.

Not all alternative feeds are created equal; some may be deficient in dry matter, energy, protein, fibre, vitamins, and minerals, while others may have a propensity to accumulate toxins, have excess mineral content causing antagonisms with other minerals, or contain other anti-nutritional factors that could have a negative impact on animal health. A livestock nutritionist or professional should inspect and analyse your feed if you want to be sure it is safe. Variability and consistency in alternative feeds, as well as loads of the same feed, could provide their own unique management challenges. You should consider the feed's impact on your animals' health and productivity as well as the cost of transporting, storing, and processing it. Software like CowBytes makes it possible to analyse feed, compare feed costs, and create a balanced diet that saves money and makes the most of scarce feed resources.

Cattle must be fed gradually altered diets to prevent sickness. Two to three weeks after a feed change, cattle can be regularly examined for symptoms of issues including poor rumen health or acidity. Using alternate feed sources can cut expenses, lessen the risk of feed procurement, and increase the availability of key feed nutrients.

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