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ANIMAL PSYCHODIETETICS

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Each year, millions of dogs world wide are abandoned by their owners, relinquished to animal shelters, and euthanized because of behaviour problems. Nutrition is rarely considered as one of the possible contributing factors of problem behaviour (Bosch et al., 2007). The influence of various food components of the diet on behaviour is an intriguing area of research and the term psychodietetics has been advanced to describe the relation between nutrition or clinical nutrition and behavioural changes (Landsberg et al., 2003). Several studies indicate that food should be ascribed diverse effects, such as nutritional, pharmacological, toxic and extra nutritional. Some of these actions affect behaviour.

Psychodietetics is the study of the effect of food eats on the state of mind. The evidence linking the impact of diet on mood and behaviour has been growing for many years. Scientific evidence reveals that foods can have immediate and lasting effect upon mental health and behaviour because of the way it affects the structure and function of the brain. Significant changes in the way food is produced and manufactured have not only reduced the amounts of essential fats, vitamins and minerals consumed, but have also disturbed the balance of nutrients in the food eaten. The proliferation of industrialised farming has introduced pesticides and altered the body fat composition of animals due to the diets they are now fed. According to the research, this unequal intake combined with a lack of vitamins and minerals is associated with depression, concentration and memory problems.

According to the Mental Health Foundation, new substances, such as pesticides, additives, and trans-fats have also been introduced to the diet. These alone and in combination, can prevent the brain from functioning effectively.

Behaviour is regulated by neurotransmitters and hormones, and changes in the availability of their precursors may influence behaviour. Amino acids are vital to good mental health. Neurotransmitters in the brain are made from amino acids, many of which need to be derived from the diet. A deficiency of certain amino acids can lead to feeling of depression and apathy.

Some foods damage the brain by releasing toxins or oxidants that harm healthy brain cells. There are many nutrients that serve the brain without deception or damage, which can improve mood and mental well being. A balance mood and feelings of well being can be protected by ensuring that a diet provides adequate amounts of complex carbohydrates, essential fats, amino acids, vitamins, minerals and water. An adverse reaction to food is any clinically abnormal response attributed to the ingestion of substance in the diet and it does not presuppose an etiology. Reaction to ingested food components can affect many body systems and produce clinical signs, involving the skin, alimentary tract and nervous system (Josephine, 1991).

Dietary intolerance in animals

a) Lactose intolerance - Food intolerance occurs if an animal lacks certain enzymes necessary for digestive process to proceed. Certain animals produce only small quantities of the enzyme lactase, and so have limited ability to hydrolyse lactose in milk. Undigested lactose remains within the intestinal lumen, allowing the proliferation of lactose fermenting bacteria, which subsequently causes diarrhoea. Neonatal death following episodes of diarrhoea is most frequent in puppies.

Puppies have adequate level of intestinal lactase to permit digestion of lactose in bitch's milk. . After puppies are weaned, however, the brush border disaccharidase activity falls to about 10% of the levels found in the young. Thus feeding excess quantities of milk to mature dogs induce diarrhoea (Gray, 1978). Careful dietary management is an important part of therapy of acute or chronic diarrhoea regardless of the cause.

b) Vasoactive amines in diets - Another food intolerance recognised is its reaction to pharmacological substances in food eg. Histamine and

ucts on animals, their toxicity and remedial measures to reduce the incriminating factors. Recommendations have also been made for their optimum level of inclusion. The results of such studies could very well be applied by the farmers on locally available resources and successfully assimilate in the total mixed rations. ICAR had sponsored "Network program on agricultural by products as animal feeds – complete feed" in different institutes of different states for last two decades. The Kerala Agricultural University under AICRP project (from 1967 to 1979) had conducted prolonged animal studies on unconventional feed stuffs available in Kerala and identified tapioca starch waste, rubber seed cake, tapioca leaf meal, silk cotton seed cake, glyricidia 'eaves, coffee husk, coconut pith, prawn waste, tea waste, crab waste, banana root bulbs, mango seed kernels could be incorporated in rations and recommend their optimum level of incorporation.

Many unconventional feed ingredients have been utilized for making complete feed such as bagasse, (e.g.: 30% sugarcane bagasse, 20% Prosopis juliflora pods, 7% mango seed kernel, 12% babul seed chuni, 8.5%maize gluten, 12% corn steep liquor, 8% molasses, 0.5% urea, 1% salt and 1% mineral mixture.) ammoniated cotton plant, cotton straw citrus peeling, ground nut hulls, reeds, cotton seed hull, tree leaves such as Sesbania grandifolia , Posopis juliflora leucenea, Gliricidia (Complete feed prepared using 50kg tree leaves, 5kg groundnut cake, 10kg rice bran,15 kg dhal chuni, 15kg molasses, 1kg urea and 2 kg mineral mixture), legume based complete feeds, alkali treated wheat straw, maize husk sunflower heads have been tested successfully as ingredients of total mixed rations.

Few examples of complete rations are given below:

Complete feed with 30.0% chaffed wheat straw, 18.0% ground nut cake(deoiled), 20.5% rice polish, 18.0% wheat bran, 0.5% urea, 10.0% molasses, 1.0% salt and 2.0% mineral mixture be used as ration of growing calves supporting the growth rate of 435 g/day. It provides 12.0% DCP and 56.0% TDN.

Complete feed with 30% paddy straw, 10% brewery waste, 10% spent lemon grass 11.5% rice bran , 5% wheat bran, 20% deoiled groundnut cake, 0.5% urea, 1% salt, 2% mineral mixture and 10% molasses can be used as ration for lactating cows.

Complete ration for Malabari goat

Feeding 45% Tapioca leaves, 15% Tea waste, 14% Gingely oil cake, 12% Bengal gram, 12% Wheat, 1.5% Mineral mix, 0.5% Salt could produce a weight gain of 60 g a day.

How Much To Be Fed?..

Cows should be fed, so that 5 percent of the offered feed is left when they are fed the next time. From a practical standpoint, this means that approximately an inch of feed is left in the feed bunk at the next feeding, and leftover feed should be removed routinely.

When increasing or decreasing the amount of TMR fed, the amount of forage, grain and each of the other ingredients need to be increased in proportion to the originally formulated TMR. Do not simply feed cows more forage if they clean up feed from the previous feeding. One of the most common misperceptions when increasing or decreasing the amount of TMR offered is to change the amount of forage offered while holding constant the amount of grains and other concentrates fed per cow. This change results in a misbalanced ration that can decrease milk production or result in health problems in the cows.

Particle Size

The effects of forage, fiber levels and particle size play an important part in making good quality Total Mixed Ration. Maintaining a proper forage size would improve the dry matter intake potential of forage diets, even when the forage quality is very poor.

Dairy cows require amounts of fiber in their rations to maintain a healthy rumen. When the desired amounts of fiber are not met, many problems can arise, including metabolic disorders.

Forage particle length is also necessary for proper rumen function. Reduced particle size has been shown to decrease the time spent in chewing and cause a trend to decrease rumen pH. When a cow spends less time chewing, there is a decrease in saliva production needed for the rumen. When this happens, pH will decrease resulting in reduced milk

fat percent. Reducing forage particle size may also reduce feed bunk sorting behavior of dairy cattle. Rations containing a greater proportion of longer particles (> 19.0-mm) are likely to have a larger difference between the feed originally offered and that consumed throughout the day because of sorting activity. Other factors such as the amount of fermentable carbohydrates also play an important role in the pH balance or rumen. Thus more critical is the NDF level of Total mixed rations. The minimum recommended level of Neutral Detergent Fibre level in total mixed ration for high producing cows is 28% and for medium producing cow, it is advisable to provide 30-45% of NDF.

Feed Mixing

Although harvesting forages at the proper chop length is critical, additional attention should be paid to the process of feed mixing, as it may result in large effects on ration particle size and uniformity. There are two types of TMR mixers, vertical or horizontal with different configurations and models within each of these categories. When choosing a mixer one should be sure that it delivers a ration of uniform particle size throughout each delivery stage.

Incorporating long-stemmed hay, especially Napier grass hay or sugarcane tops in the ration poses a unique set of system requirements. Grass hay and straw may wrap around augers, making it impossible to incorporate it into a mixed ration. Depending on the mixer, the amount of long-stemmed hay that can be added to the mixer may be limited. Some models can handle long-stemmed roughage when it is less than 10 to 20 percent of the TMR. Many mixers will not handle grass hay unless it is chopped before being added to the mixer. Therefore, some type of hay processor or tub grinder is needed.

Under our condition, it is not economical for a single farmer to possess feed mixers. Cooperatives and district governing bodies could collectively procure the mixer for evolving economic total mixed rations by mixing locally available feedstuffs. A workable option would be a mobile mixer, which collects the resource feed stuff from local area, mix them to have a balanced complete ration and delivered at farmer's doorstep. For this, a tractor could be modified by a trailed chassis, for coupling to a tractor power unit, and fitted with one or more braked axles, a mixing body, and a weighing sensor. There are three main types of mixing body:

Paddle, whereby a central axial shaft turns a series of paddles which rotate the contents and provide front to back mixing.

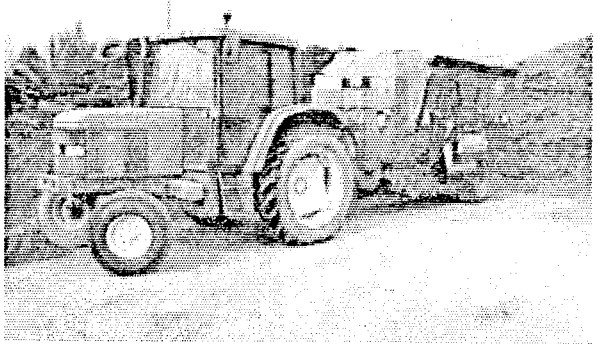
Vertical auger, with one or two augers used to move the contents from top to bottom.

Horizontal auger, containing between one and five augers, used to circulate the contents from front to back and bottom to top.

Mixing The TMR

In general, minor ingredients, minerals, protein supplements, and grains are added to the mixer first and forages last. However, this formula varies with the type of mixer and feeds being mixed, so follow manufacturer's recommendations. The mixing time required is about four to five minutes. Longer mixing would result in fine grinding of forages and a mushy mix that cows do not relish. Under mixing, a TMR can happen when mixers are overfilled. To get the most efficient mixing, fill only to about 90 percent of the mixer's capacity. To avoid either over mixing or under mixing, develop guidelines that specify the order of adding ingredients and how long to run the mixer between feed additions and after all feeds are added. When more than two forages are being mixed, the fodder with lower in bulk density should be added first followed by the one with higher bulk density. Molasses is added at the final mix.

Pelleting of total mixed ration reduces the dustiness of feed, improving the palatability and reduced sorting of ingredients. Pelleting also increases the feed intake, higher passage rate, higher milk



Feed Mixer

production but reduced feed conversion ratio, higher cost of pelleting. Dusty and high bulk materials could be utilized better by pelletization.

Conclusion

Mixing TMR on farms will have its advantages and disadvantages. Having a complete ration is an overall advantage, being able to mix forages, protein supplement, minerals and vitamins altogether.

Particle size plays a very important role in Total Mixed Rations. Although particle size analysis in not the end of rations problems, it improves the overall feeding and nutrition of the dairy cow. The major advantage of using complete ration is the flexibility of incorporating a wide range of feedstuff and thus facilitating the formulation of economically viable rations. Overall, the Total Mixed Rations system for feeding dairy cows has become increasingly popular. Milk production and milk fat content of cow can be improved and feed and labor costs minimized, with this system in place.

Reference

AICRP. All India Co-ordinated Project for investigation on agricultural byproducts and industrial waste materials for evolving economic rations for livestock. (1967-1979) Department of Nutrition college of Veterinary and Animal Sciences, Mannuthy.

Deepa Ananth (1998) Nutritive evaluation of complete ration for growth in kids. M.V.Sc. thesis submitted to the Kerala agricultural University.

Donna M. Amaral-Phillips, José R. Bicudo, and Larry W. Turner (2002). "Feeding your dairy cows a total mixed ration:Getting started." Cooperative extension services University of Kentuky, College of Agriculture. http://www.ca.uky.edu/agc/pubs/id/id141a/ID141A.PDF

I.C.A.R. crop science division (2006) "Livestock management" www.icar.org.in

Kononoff , P.J. and Heinrichs, A. J. (2007). Forage and TMR Particle Size and Effects on Rumen Fermentation of Dairy Cattle. Extension.htm.

Total mixed ration an overview (2006) http://en.wikipedia.org/wiki/Total_Mixed_Ration_(TMR)

Schroeder, J.W.and Park, C.S. Using a total mixed ration for dairy cows. (1997) A.S.-769 http://www.ag.ndsu.edu/pubs/ansci/daiy/as769w.htm

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