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BYPASS **PROTEIN**



**DEPARTMENT OF ANIMAL
NUTRITION**

***ROLE OF BYPASS
NUTRIENTS IN HIGH
MILK YEILDERS***

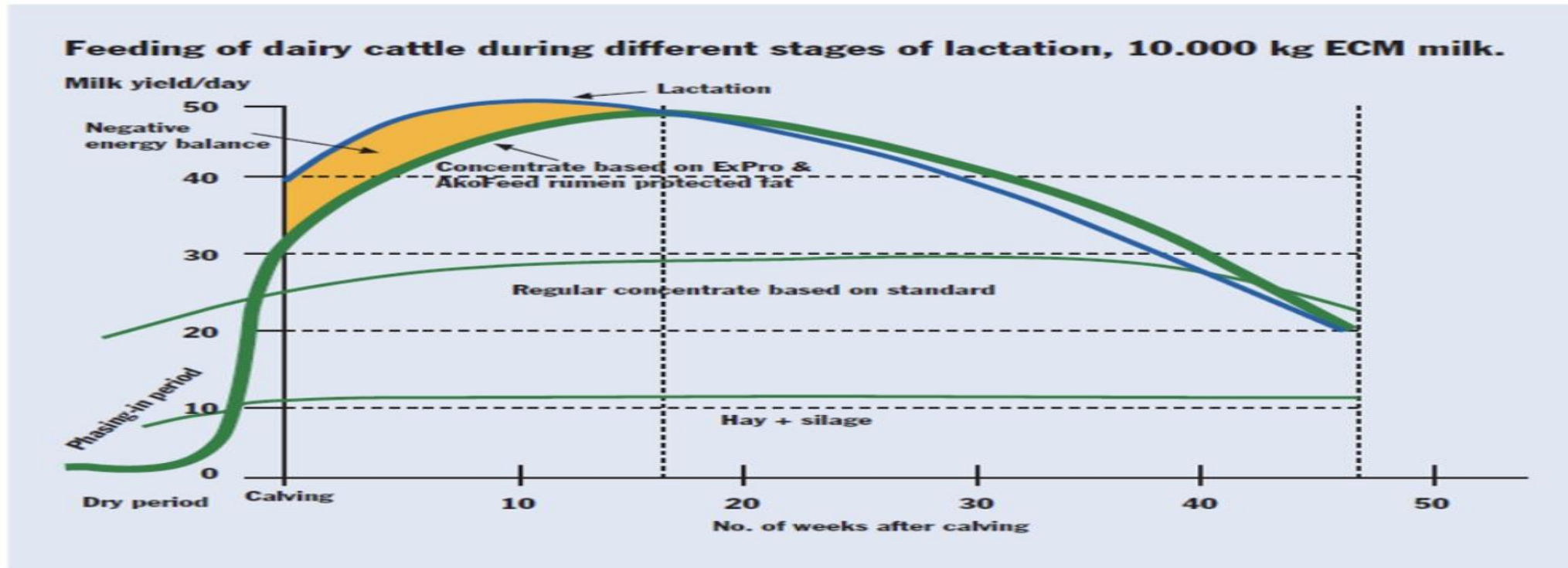
Let's see outline of presentation

- Importance and metabolism of dietary proteins in ruminants diet .
- Necessity of rumen bypass protein .
- Supplementation of bypass protein .
- Methods of production bypass protein.
- Impact of bypass protein on livestock production .

**Any
confusion ?**



Need of bypass nutrients



COWS SHOULD REACH PEAK DRY MATTER INTAKE BETWEEN 10-13 WEEKS AFTER CALVING

• *Mostly animal in Negative energy balance leading to weight loss*

INTRODUCTION

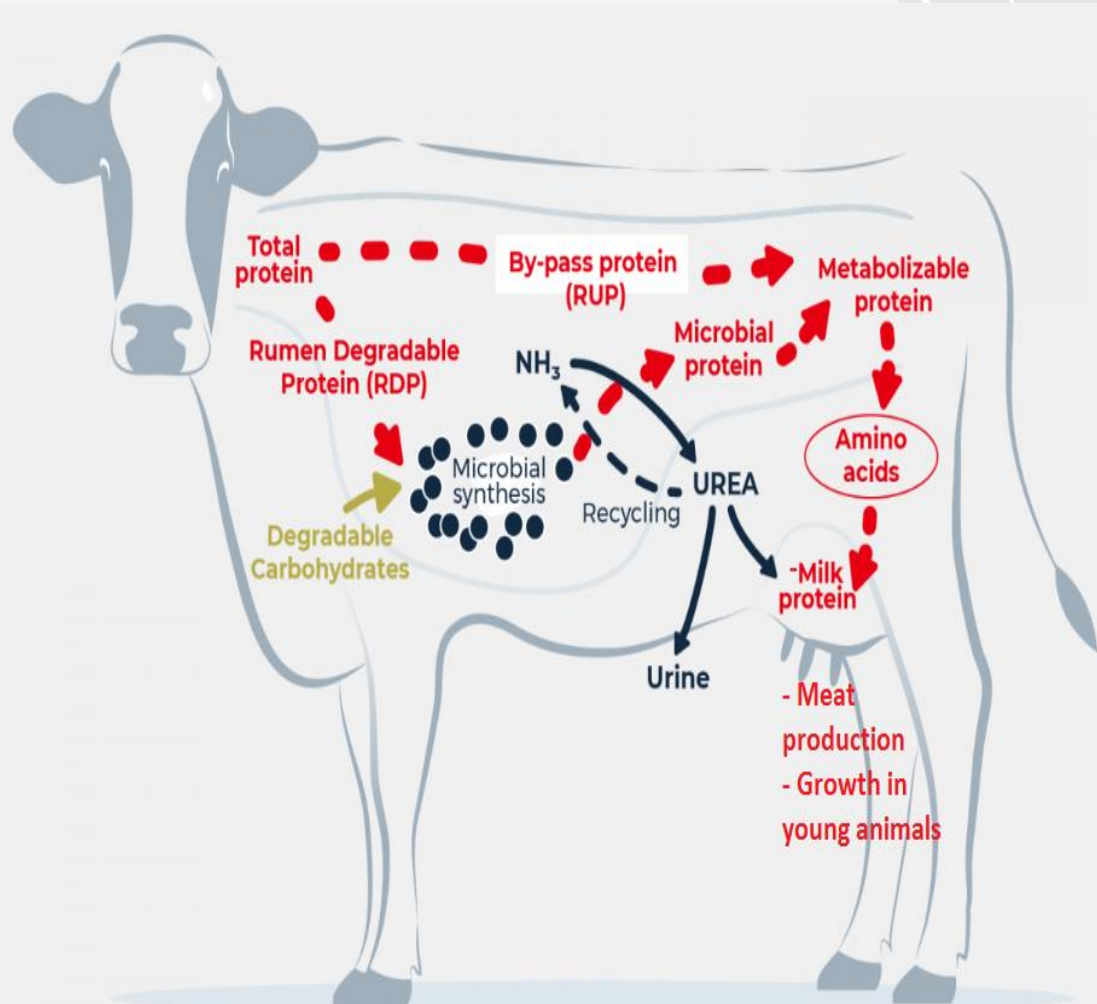
what is bypass nutrients?

- By-pass protein refers to dietary protein that escapes rumen degradation.
- The technology aims at decreasing the wasteful production of ammonia in rumen from highly degradable protein meals, thereby increasing the availability of essential amino acids at the intestinal level.
- The main aim is to increase the efficiency of protein utilization in ruminants for enhanced milk production.
- In general – Protein requirements met from microbial protein and rumen degradable protein.
- NEED OF BYPASS PROTEIN
- In early lactating period of high yielding animals (more than 15 kg/day)
- Provide greater amount of essential amino acids at SI

CONSIDERATIONS ABOUT SLOWLY DEGRADABLE NUTRIENTS

1. There are three type of nutrients that could bypass rumen fermentation to certain degree:
protein/amino acids
starch/glucose
fats/fatty acids
2. The purpose of feeding "bypass" protein is that a large proportion of the protein is available directly at the lower part of gastro-intestinal tract, where it is digested and then absorbed as amino acids for utilisation tissue level.
3. Feeding of "bypass" starch reduces excess production of lactic acid in the rumen which would otherwise result in low rumen pH (acidosis), thereby affecting fibre digestion.
4. Feeding of "bypass" fat (protected fat) is done primarily to avoid ruminal hydrolysis of bio-hydrogenation of unsaturated fatty acids and increasing energy density of feeds. The fats are thus digested mostly in the small intestines and absorbed as unsaturated fatty acids without affecting the fermentation of fibrous feeds in the rumen.

DEGRADATION OF PROTEINS AND AMINO ACIDS IN THE RUMEN



- The first chamber has a storage capacity of 50 to 60 Litres , where straw & fodder get fermented, This chamber is called rumen.
- There is an immense amount of bacteria in rumen, these bacteria help in digesting straw & fodder, but when we give the animal a protein meal, bacteria turns 60% to 70% of protein into ammonia & this ammonia turns into urea in the liver, which excretes of the body through urine.
- So, the whole protein meal which is essential for the animal is wasted. But if we give appropriate chemical treatment to the protein meal, then the bacteria present in the rumen can't break the meal & it will be well absorbed and digested in the lower part of the stomach.
- This method of processing protein meal is called **BYPASS PROTEIN TECHNIQUE**. The bypass protein supplementation provides amino acid which is absorbed by the small intestine, this increases the milk production of milch animals.

SOURCES OF BYPASS NUTRIENTS

Some nutrients have bypass characteristics in their natural forms. However, others are required to be manipulated to reduce their rumen degradability for optimisations of ratios between degradable and undegradable nutrients in the diet.

- ❖ Protection of proteins : The main methods available to protect proteins are the use of chemical reagents or heat treatment.
- ❖ Protection of carbohydrates : Protection of starch can be achieved with formaldehyde treatment. Ammonia treatment could be another effective method to protect starch from ruminal hydrolysis. Treating starch with sodium carbonate plus sodium hexameta phosphate has been demonstrated to reduce starch degradation in the rumen.
- ❖ Protection of fats : encapsulated by formaldehyde treated protein is an effective method of protection against ruminal hydrolysis and bio-hydrogenation of lipids, but due to the use of formaldehyde, the method has its limitation.



METHODS OF MAKING BYPASS NUTRIENTS

HEAT TREATMENT

- ❖ Dry heating at more than 100°C at various exposure time
- ❖ **150°C for 2 hrs~GNC**
- ❖ **100°C for 30sec~SBC**
- ❖ Traditional boiling of crushed maize & wheat
- ❖ Inactivation of enzymes and inhibiting factors
- ❖ Improvements of nutritive value of the feeds
- ❖ Improvements in the animal performances

Drawback:

Excessive heat ~**maillard** reaction

FORMALDEHYDE TREATMENT

- ❖ Formaldehyde-**1.0-1.2g** of cake protein is sprayed on a cake in a closed chamber & sealed in plastic bags for **4days**,so that
- ❖ Formalin gets absorbed on the cake particles-reversible & PH dependent protection of proteins against proteolytic enzyme(in acidic pH-abomasum bonds are loosened).

Drawbacks

Formaldehyde is degraded to **CO₂** & **H₂O** in liver

Benefits of Feeding Bypass Protein Feed

- Increase in efficiency of utilization of proteins.
- Increase in the availability of essential amino acids.
- Increase the supply of limiting amino acids like lysine and methionine to the small intestine.
- Improvement in milk production.
- Improvement in fat and SNF per cent.
- Better growth in young animals.
- Easier to meet the requirement of high yielding animals.
- Improvement in reproduction efficiency.
- Better resistance against diseases.
- Helps in increasing net daily income.
- Good increase in live weight gain of meat purpose animals.





PRACTICAL IMPLICATIONS OF FEEDING BYPASS NUTRIENTS

Theoretically speaking, there appears to be good reasons to feed bypass nutrients for increased efficiency of nutrient utilisation by ruminants, especially at higher production levels. In practice, however, the animals' response is quite variable. In the case of lactating ruminants, the response depends on several factors, such as:

- ❖ physiological status
- ❖ stage of lactation
- ❖ level of production
- ❖ body condition score
- ❖ availability of other nutrients.

NATURALLY PROTECTED PROTIENS

Feed	UDP %	Feed	UDP %
Maize (grain)	65	Blood meal	76 – 82
Barley	21(11-27)	Fish meal	71 – 80
Sorghum	52	Meat meal	53 – 76
Bajra	68	Brewers dried	53
Oat grain	14–20	Corn gluten	53
Wheat grain	20–36	Wheat bread	29
Cotton seed meal	41–50	Corn silage	27
Linseed meal	11–45	Rice straw	63
Ground nut meal	30	Wheat straw	45
Rapeseed meal	23	Para grass	52
Soybean meal	28 (15–45)	Cow pea	32 – 45
Sunflower meal	24	Berseem	37 – 52
Subabul	51 – 70	Alfa-Alfa	28

HIGH BYPASS PROTEIN SOURCES

FISH MEAL (FM)

- High bypass protein.
- High in essential amino acids
- High in Vitamins-B.



Drawback

- Low availability
- High price
- Excess oil ~ rancidity.
- Inadequate drying may allow molding



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HIGH BYPASS PROTEIN SOURCES

BLOOD MEAL (BM)

- High in available lysine
- High in methionine



Limitation

- High cost of drying
- Expensive source of bypass protein
- Palatability problems



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HIGH BYPASS PROTEIN SOURCES

MEAT MEAL (MM)

High amounts of phosphorus and fat

Limitations

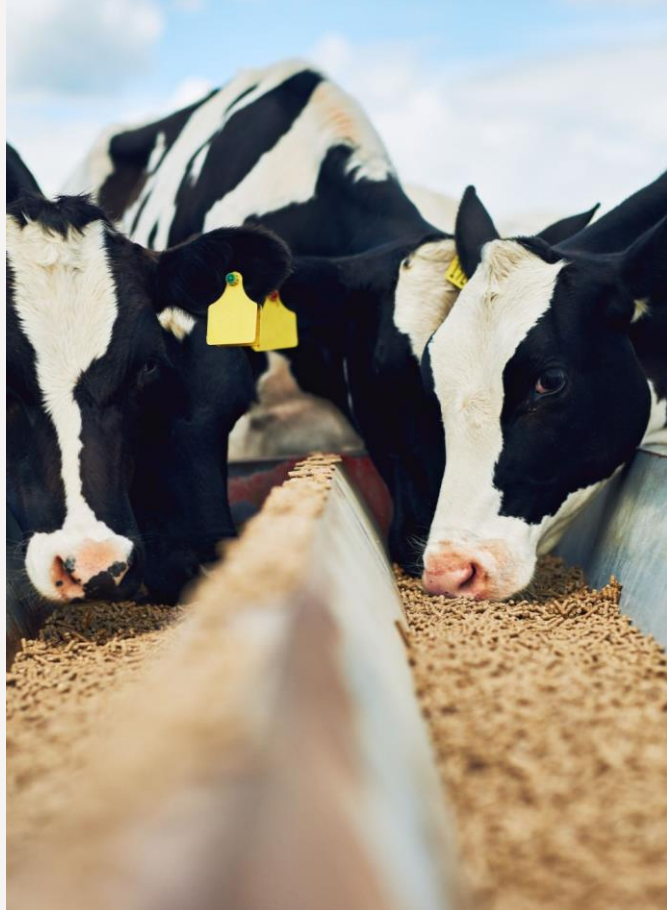
The value of protein in meat meal depends on

Amount of heat applied in drying

Amount of bone and hair contamination.



Effects of Bypass Proteins on Animal Performance



Biochemical and nutritional basis by which bypass protein show its effect on animal performance are

- Additional supply of amino acids at intestinal and tissue level
- Lower ammonia production in the rumen because proteins are fermented to ammonia and low degradation of protein will lower ammonia level.
- Lower urea synthesis in liver as ammonia is being absorbed at lower level which saves energy.
- Best Utilization of Protein Resources Beneficial Effects of Bypass Proteins .

Reproductive efficiency



- Because of high growth rate caused through protein feeding, the young stock can attain early maturity to start the reproductive life at an earlier age.
- It has been shown that bypass protein feeding can improve the reproductive efficiency of breeding buffalo bulls and cross bred bucks, both with respect to sexual behaviour, including libido score as well as the seminal attributes like ejaculate volume, mass activity and sperm count per ml, similar positive results were obtained in females, where the conception rate increases after feeding of bypass proteins.

Growth Performance



- Feeding of bypass protein meals significant increases the growth rate of animals
- The increase in growth rate of these animals was found to be in range of 30 -40 %.(chatterjee and walli,2003)
- Feeding of Bypass protein to growing stock, not only increases growth rate, but also improve feed conversion efficiency.
- In fact, it not only results in reduction in the cost of rearing, but due to higher growth rate, it also results in attaining early maturity by male or female animals.
- This is definitely a bigger surplus in terms of improvement in reproductive efficiencies of these animals.



Lactating Performance

- Most of feeding trails resulted in significant increase in milk yield.
- The increase in milk yield varied in the range of *8_– 10 percent.(walli and sirohi, 2004)*
- The studies conducted on medium producing animals, proved that bypass protein feeding can be beneficial to the animals, producing 8-10 liters of milk per day.

CONCLUSION

Supplementation of bypass protein to medium and high yielding growing animals increases the live weight gain, DM intake and milk production in animals.

1. ↑ growth rate (20-40%) & ↑ milk yield (10 – 15 %)
2. Increased feed utilization.
3. It is a cheaper and safer technology.
4. Milk safe to human consumption.

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Thank you for your attention!

Any questions or comments?

