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## Livestock feeding strategies (ruminants, pigs and poultry)

*Match the nutrient requirements (protein content of diets) at all stages of production to improve nitrogen use efficiency*





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## Cattle diet

*You can reduce the amount of nitrogen excreted by your cattle by matching (as closely as possible) the nitrogen content (crude protein content) of diets to the expected level of production and the particular growth stage of the stock.*

*The aim should be to achieve general good health and welfare and feed optimisation to improve nitrogen use efficiency.*

# Cattle diets

## You can reduce the amount of nitrogen excreted by your cattle

- By matching (as closely as possible) the nitrogen (crude protein) content of diets to the expected level of production and the particular growth stage of the livestock
  - The retention of dietary nitrogen (crude protein) by cattle is low with 65–90% of that fed being excreted in urine and faeces
- Research has confirmed that it is possible to reduce crude protein (CP) in animal diets without affecting animal performance, health and welfare
- A reduction of 1% CP content in ruminant diets can reduce  $\text{NH}_3$  emission by 5–15%
- The aim should be to achieve general good health and welfare and feed optimisation to improve nitrogen use efficiency

**Crude Protein (CP):** Crude protein measures the nitrogen content of a feedstuff, including both true protein and non-protein nitrogen

# Good Practices Cattle diets

Techniques for reducing ammonia emissions through diet selection, management and improved feed efficiency

- **Take advise** to formulate rations for cattle, taking account of breed type, gender, stage of production and the quality of feeds available on the farm
- **Know the dietary crude protein (CP) content of home grown forage**
  - Where possible, this should involve regular, representative sampling of Total Mixed Rations (TMR) and/or feeds with variable CP content (such as fresh grass and silage)
- **Full nutritional analysis should be carried out for all forages (when possible)**
  - Feed program precisely calculated based on energy requirements and digestibility of forage, then balanced with appropriate proteins to ensure optimum nitrogen utilisation
  - The diet must ensure the rumen is supplied with the right balance of fermentable energy and protein and that the cow has an adequate blood glucose supply
- **Consider the farm-specific situation**
  - Higher and successful CP reductions (**around 2-3% units**) can be achieved more easily in TMR-based feeding systems. For example, CP content can be decreased from 18 to 15% (dry matter basis) in housed early lactation dairy cows fed with a maize-silage based TMR with no negative effect on production

# Good Practices Cattle diets

Techniques for reducing ammonia emissions through diet selection, management and improved feed efficiency

- **Precise balancing of protein requirements** to achieve protein levels of 15 to 16% in total ration in early lactation, depending on expected milk yields - reducing by 1 or 2% in late lactation. The priority is to maintain the cow in a positive energy balance and prolong her productive life.
- **Establish the protein requirements of your animals** and adjust or balance feed accordingly.
  - Accurate determination of ruminant protein requirements and the supply of amino acid available for absorption are critical for optimising dairy cow performance, while minimising N inputs and NH<sub>3</sub> emissions
  - Recalculate the protein requirements of your cows throughout the lactation and adjust or balance feed according to yield and body condition
- **Use of grass varieties** with a high content of water soluble carbohydrate can reduce N urinary excretion by 29% through more efficient utilisation of the dietary N in the rumen.
- **Increasing dietary fermentable carbohydrate content and improving forage silage quality** can decrease N excretion.
- **Avoid overfeeding dietary CP**
  - This is the main reason for low efficiency of nitrogen utilisation.

Surplus nitrogen present as crude protein in the diet is excreted by cattle mainly in the form of urea in the urine



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## Poultry diet

*You can reduce the amount of nitrogen excreted by your poultry by matching (as closely as possible) the nitrogen content of diets to the expected level of production and the particular growth stage of the stock. The aim should be to achieve general good health and welfare and feed optimisation to improve nitrogen use efficiency.*

# Poultry diets

Broilers and layers in commercial houses are fed with **high crude protein (CP) diet** to meet their daily nutritional needs for growing and production (meat or eggs)

**Higher CP feed tends to result in increase nitrogen in manure and a higher  $\text{NH}_3$  emission** because undigested proteins and uric acid are primary  $\text{NH}_3$  emission sources

**Use of fibrous diets like distiller dried grains plus soluble (DDGS) in diet**

→ had shown reduced  $\text{NH}_3$  emission without negative impact on egg production

→ The diet formulation with 20% DDGS resulted in an  $\text{NH}_3$  reduction of 26%

**Diet manipulations play an essential role in  $\text{NH}_3$  production**

→ Feed additives can alter the microbiological environment of an animal's digestive tract and the nutrition content of faeces, and the gaseous emissions it produces

→ Enzyme supplementation (increases amino acid digestibility)

**→ That's why it is very important to have an improvement in nutrient utilization efficiency**

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**Distillers dried grains with solubles (DDGS)** is a feed material, which is obtained from fermentation of corn and different cereals as a by-product in the process of ethanol production.



# Good Practices poultry diets

Improve feed conversion to weight gain and reduce feed surplus by adopting high standards of management and welfare and monitoring feed and water intake and growth rate

→ Match the nutrient requirements at all stages of production to improve the precision of nutrient supply

→ Decrease crude protein levels in feed, with amino acid supplementation, or dietary supplementation with DDGS and other feed additives

Low CP diets generally involve a decrease in soybean meal, compensated by higher grain content.

This change increases dietary starch and decreases dietary lipid levels

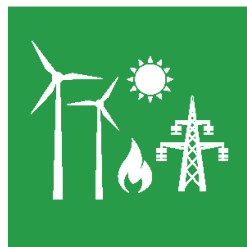
To meet nutritional needs, these diets also include higher amounts of crystalline (synthetic) amino acids

**Take advice!** nutritionists can help to regularly review diets and adjust least-cost formulations to meet nutrient requirements





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## Pig diet

*You can reduce the amount of nitrogen excreted by your pigs by matching (as closely as possible) the nitrogen content of diets to the expected level of production and the particular growth stage of the stock. The aim should be to achieve general good health and welfare and feed optimisation to improve nitrogen use efficiency.*

*techniques for reducing ammonia emissions through diet selection and management and improved feed efficiency*

# Good practices in pig diet

→ Improve feed conversion to weight gain and reduce feed surplus

→ by adopting high standards of management and welfare > the feed, especially the protein content, is used efficiently

→ by monitoring feed and water intake and growth rate

→ Match the nutrient requirements at all stages of production to improve the precision of nutrient supply

→ Consider options such as multi-phase feeding as ways of improving the precision of nutrient supply, thus reducing waste and emissions.

→ Regularly review diets and adjust least-cost formulations to meet nutrient requirements

→ Consider professionally formulated diets, containing synthetic amino acids, enzymes and other feed additives to help reduce nutrient excreted.

→ For example, a decrease of 1% in dietary crude protein in the diet of finishing pigs results in a 10% reduction in total ammoniacal nitrogen (TAN) content of the pig slurry and 10% lower ammonia emissions

**Take advice!** to make changes in ration formulation before making adjustments to your pig diets



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# Thank you!

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