DW01: Animal feed charactérization

Part 02 : Concentrated feed

- It is a food with a high net energy content in DM. Some also have a high nitrogen content;
- The term "concentrates" relates to the concentration of calories in a small volume of food.
 Exp.: Cereals will have a strong nutritional power in small quantities.
 Unlike hay which represents a large volume.
- * Concentrates are used to balance, in nitrogen and energy, the basic ration (established from fodder) called "*proofreaders*".
- * Once the basic ration is balanced, concentrates called "*of production*", are brought in addition in order to support milk production.
- * The quantity administered is then a function of the level of milk production;
- * These production concentrates are commercially available or farm-made ACCs and distributed individually
- A large variability in the effectiveness of the concentrate:
 - *In winter season,* an input of 0.7 to 1.5 kg of [C] allows the production of 2 l extra milk
 - *In the pasture,* the efficiency is extremely variable with an average of 1 kg of [C] for 1.5 l of milk
- We distinguish:
 - Simple concentrated foods
 - grains (cereals, oilseeds and protein seeds)
 - o fruits
 - by-products of these seeds and fruits
 - foods of animal origin
 - Compound concentrated feeds
 - o simple concentrated feed mix
 - may also contain a certain proportion of other foods (fodder)

Concentrated foods are: (rich in at least one nutrient)

- *Rich in energy* (=). Energy richness is often due to:
- → *starch*, generally well-digested carbohydrate (cereals and cereal by-products)
- → *plant walls*, low lignification and easily digestible (soybean hulls, beet pulp)
- → *significant lipid fraction*,(oil seeds (soybeans, rapeseed, etc.)
 - *Rich in nitrogen* (and often in energy)
- → protein seeds (peas, field beans, etc.)
- → oilseeds (soybeans, rapeseed, etc.),
- → oilcakes (soybean, rapeseed, sunflower, peanut, etc.)

→ other by-products (brewery grains, etc.)

- Low in fiber
- Protein variables:
- \rightarrow cereal grains < 12%
- \rightarrow oilcakes > 30%.
 - *high palatability* ⇒ingested quickly, low volume per unit weight (high density)
 - *Ferment faster* in the rumen **Rich in minerals,**Phosphates, carbonate, Mg salts, Zn salts, Mn, Cu...
 - Rich in vitamins, Yeasts... and synthetic vitamins authorized

Co-products

- *Co-products* are the plant parts that remain following an agri-food transformation process:
- sunflower, rapeseed or soybean cakes after pressing the seeds to extract the oil
 - beet pulp after sugar extraction
 - sound obtained after grinding cereals into flourwhich, for the most part, can only be used in ruminant feed.
- Co-products are the plant parts that remain following an agri-food transformation process, e.g.:
 - o The crabssunflower, rapeseed or soybean after pressing the seeds to extract the oil
 - o *The pulp* beetroot after sugar extraction
 - *The sound* obtained after grinding cereals into flour which, for the most part, can only be used in ruminant feed.

• Co-products

They are used for feeding livestock are very varied are:

- Crop issues:

- Cereal or legume straws
- o Withdrawals or sorting discrepancies of fruits and vegetables

Co-products of the agri-food industries:

- o Beet pulp
- Whey
- Brewery waste
- Vegetable oilcakes
- Vegetable or fruit waste
- A by-product, also called a co-product, is a product obtained from the manufacturing process of another product (a product which necessarily appears during a manufacturing process).

Co-products of zootechnical interest

3 main categories of co-products:

□ Plant crop by-products:

- * *Lignocellulose-rich co-products* (cereal straws, protein peas and corn stover)
 - very useful during periods of shortage (drought year);
 - high content of crude cellulose and lignin (therefore low nutritional values);
 - used for animals with low needs or when the ration is rich in concentrates
- * *Fruit and vegetable sorting discrepancies*,(including potatoes), fairly moist foods, used directly fresh or after storage

□ Co-products of the agri-food industries Their origins are diverse:

- * <u>*Co-products from the processing of oilseeds*</u>, are the different oilcakes (soybean, rapeseed, sunflower, etc.). are appreciated by breeders for their high nitrogen and energy values
 - * <u>Co-products of the sugar industry</u>, Mainly beet pulp (fresh or pressed) used directly or dehydrated.
 - * *By-products of the cereal industry*, The main ones are bran and milling waste.
- Cereals are rich in starch (65 to 70% of their DM) and therefore have high energy contents.
 low to medium nitrogen content depending on the cereal;
- Several cereal co-products are used in animal feed:
 - Milling by-products (bran and rebulet)
 - Malting/brewery co-products (spent grains)
- * <u>Milling by-products:</u>
 - **The sound** is the outermost part of the wheat grain
 - Rebulet is obtained by removing the deeper layers located between the bran and the interior of the grain

his and rebulet are marketed as a single product

- * <u>Malting/brewery co-products (spent grains)</u>
 - **The spent grains**are co-products of malting and brewing: barley is first transformed into malt in a malt house, and the malt is fermented using yeast in a brewery.
 - The high nitrogen content of spent grains makes them an interesting protein feed for supplementing a high-energy ration.
 - *Co-products of the milk industry: whey*, from cheese making, food rich in energy (lactose) but low in nitrogen (almost entirely dehydrated)
- * <u>Co-products of the milk industry: whey</u>, Coming from cheese making, food rich in energy (lactose) but low in nitrogen (almost entirely dehydrated)
- * <u>Brewery co-products</u>

Ddried grains for livestock feed manufacturers and wet grains for breeders, are of excellent nutritional value (rich in nitrogen).

* <u>*Co-products of fruit and vegetable canning</u>* Shave processing waste from canning factories, are only partially used in animal feed (delicate preservation).</u> * <u>Co-products of industrial potatoes</u> (esorting carts, peels, raw pulp, puree, dehydrated pulp).

Protein and oilseed seeds

- Are concentrated foods rich in energy and nitrogenous matter:
 - protein crops: peas, field beans, lupin, etc.
 - \circ oilseeds: flax, soybeans, rapeseed, etc.

Protein crops

- Protein seeds are all rich in both protein and energy;
- But it is necessary to distinguish, based on the starch and MG (fat) content:
 - seeds rich in protein and starch but low in fat (peas, field beans)
 - seeds rich in protein and fat but low in starch (lupin)

> Oilseeds

- Oilseeds (flax, soybean and rapeseed) are seeds which are intended to produce oil in oil mills as the main production, the co-product being*the crab*.
- These seeds are therefore characterized by very high fat contents of around 20 to 45% of the dry matter and, of course, very high energy contents as well;
- the reserve substance being here *fatty acids* and not *starch*
- Incorporating oilseeds into the ration for protein supplementation is limited by the final MG content of the ration which cannot exceed 5% of the DM.

The crabs

– The main cakes used are: soybean, rapeseed, sunflower and flax cake.

The crabs

- Oilcakes are solid co-products obtained after extraction of oil from oilseeds;
- These are therefore co-products of the oil industry;
- Their two main characteristics are a high energy and protein nitrogen content. Depending on the meal considered, this varies between <20% and >40% of the dry matter.
- The main cakes used are: soybean, rapeseed, sunflower and flax cake.

Roots and tubers and their derivatives

Roots and tubers result from the accumulation of carbohydrate reserves in the underground parts of plants:

- \circ $\mathit{Roots} sugar$ and fodder beet, chicory, turnip, carrot and cassava
- Tuberspotato and Jerusalem artichoke.
- Are foods characterized by a very high water content and low nitrogenous contents
- The reserve substances are mainly starch;
- Tasty foods, generally very digestible;

Exp.: Beets

- two types of beet: sugar beet (> 24% DM) and fodder beet (< 12% DM);
- Fodder beets can be chopped and mixed into corn silage;
- Fodder beets have low DM content, high soluble sugar content and high energy content.