Evaluation of solutions for consistent palatability and feed intake

The important role of feed palatability in livestock animals, and particularly in some species, is reflected in their sensitivity to the smell and taste of feed, which influences their feeding behaviour. New technologies have enabled the use of palatants to stimulate the appetite and feed intake of animals, increasing their performance.

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Various palatants are used in the diet of animals to encourage a higher or more consistent feed intake, leading to a more homogenous performance. Nevertheless, at the end of the day, it is of the highest importance to pay attention to the palatability of the compound feed, taking into account ingredients with good or bad palatability and their interaction over time.

The impact of palatability on feeding behaviour

Palatability is often defined as the hedonic reward (pleasure) provided by foods or fluids that are agreeable to the 'palate', which often varies relative to the homeostatic satisfaction of nutritional, water, or energy needs. The palatability of a food, varies with the composition of the food, and also with the state of an individual.

Different animals will have different sensibilities to different ingredients, and, even for the same species, different individuals, with different age or gender will show different preferences.

For feed manufacturers and nutritionists, palatability can be seen as a concern and an opportunity. Indeed, several factors can play a role and impact positively or negatively on the attractiveness of feed:

- **Formulation variations:** Feed formulations can often vary, some raw materials can be changed, this does not usually impair the nutritional value of feed but might impact (positively or negatively) its palatability.
- **Raw material variation:** In parallel, even when formulations remain unchanged, raw materials can have a different smell or taste over the time, or be used at different inclusion level, which reduces intake.
- **Palatability variation:** High level of fats shows a higher risk of oxidation that can create some unpleasant rancid smells and reduce feed consumption by animals. This can also reduce the shelf life of feed or damage its quality over time.
- **Low palatability ingredients:** Some raw materials can have a positive effect on health and performance of animals but a negative effect on feed taste or smell. High levels of trace minerals or certain medicines (antibiotics) can reduce feed intake. Levels of fibres or starch can also have an effect on feed consumption, etc.

As a consequence, the management of feed palatability can greatly contribute to few objectives:

- Ensure a consistent taste and smell of feed, also in the case of reformulation or feed optimisation.
- Guarantee an optimal feed consumption of animals, also during stress or transition periods.
- Preserve the quality of feed and create an olfactory footprint for customers.

Measuring palatability with panels

While palatability can be of great interest for feed producers, it is actually quite difficult to evaluate it and predict the future response of animals. The perception of smell and taste will vary, depending on the species, the environment and the application. Not all animals have the same taste or smell receptors, and as a consequence, not all animals will have the same sensibility to taste and smell, and not all animals will show the same preference.

To take into account this variability, different strategies have been investigated, based on chemical analyses, sensorial analyses or field evaluations.

At the end of the day, the different approaches are useful to build a comprehensive understanding and propose the best formulation that guarantee a good palatability of feed and secure optimal consumption for the animals.

In a recent test (see Fig. 1), a team of panellists evaluated samples of flavours from different suppliers through a blind ranking test. Each

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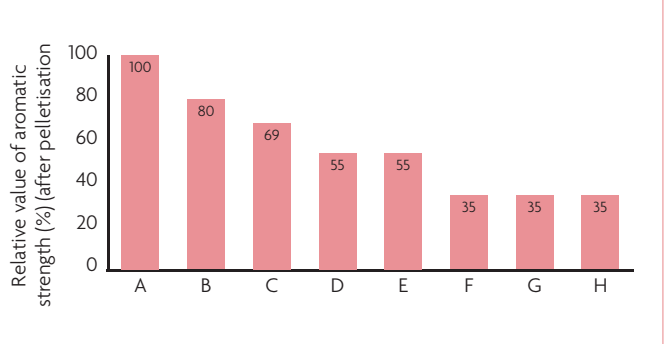
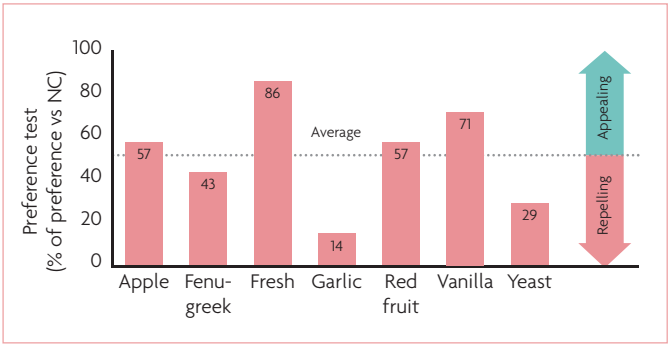
Fig. 1. Evaluation of eight flavours (same red fruits profile) with a group of panellists (Nuqo, 2020).





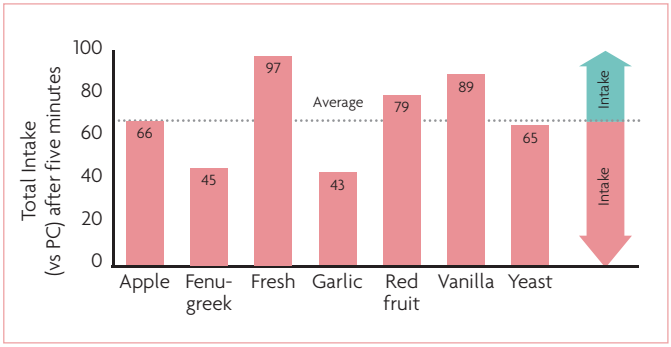


Fig. 2. Evaluation of seven palatants (different profiles) with a group of animals (equine).

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flavour was diluted in a carrier and dosed to have an equivalent cost per ton of feed. Later, the same flavours were evaluated in pelletised feed, still based on the same dose. All flavours had a red fruits profile.

The different tests have shown differences of intensity when products were applied in feed at different conditions: All products have a pleasant fruity smell with different additional notes but product A showed the highest intensity, products B, D, H showed the lowest, especially after pelletisation.

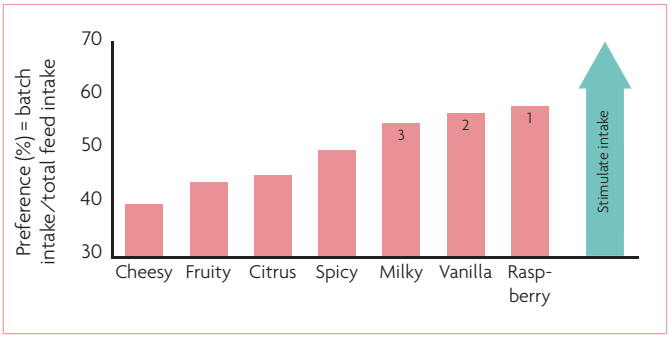
The comparison based on cost per ton of feed and flavour intensity showed substantial differences between products, in term of return on investment.

Nevertheless, evaluation of flavours with human panelists might not be enough to measure differences. Due to an innate survival mechanism for avoiding the over-consumption of toxic plants, horses are naturally sensitive and described as 'fussy eaters'. Thus, a panel of horses can be helpful to evaluate feed palatability. In a recent trial (see Fig. 2), a panel of horses was used to evaluate the palatability of different ingredients.

The objective was to determine the impact of each ingredient to improve or damage the palatability of feed. In that test, animals were exposed to regular feed (Negative control NC) or feed supplemented with one ingredient (Positive control PC) for five minutes. Ingredients were tested in a random order for every participant. Preference was measured for every test as well as Intake. Some ingredients reduced the attractiveness of feed, while others such as apple or fenugreek flavours had limited effects.

Finally, red fruits, vanilla or fresh flavours had a positive effect on preference and intake. While some ingredients have a positive impact on health, nutritionists may need to combine them with palatable ingredients, to preserve feed intake.

Fig. 3. Impact of seven palatants (different profiles) on feed intake and preference of piglets.



Help pigs through weaning challenges

As a matter of fact, it is difficult to provide accurate guidelines for every situation. In that respect, it is important to work with multiple points of references, good analytical feedbacks from the laboratory and, last but not least, practical experiences from the field.

Finally, it is critical to consider not only the effect of each ingredient but the overall palatability of formulation.

In a recent trial made with different groups of piglets, different feed flavours were evaluated, based on the consumption of feed, during a preference test (see Fig. 3) (‹50% = piglets preferred the control feed / ›50% = piglets preferred the flavoured feed).

During that test, the citrus, cheesy and fruity flavours reduced the palatability of the feed; the spicy flavour did not impact the feeding behaviour of the piglet; finally, the milky, vanilla and raspberry flavours increased the palatability of the feed.

This test highlights the difficulty to assess the right solutions, especially as different solutions with the same profiles can also show different properties (see Fig. 2). It is important to analyse facts with a rational mindset, to collect practical feedback from the field, and work high quality palatants.

Concerning the global situation today, nutritionists and feed formulators have got more challenges with raw materials, that fluctuate both in terms of quantity, price and quality. They need to find alternative solutions that they need to optimise their sourcing of raw material but also to maintain the feed quality and palatability.

Selection of the palatants must take into account the palatant quality to maintain or improve feed palatability and feed intake and to guarantee the consistent results on animal performance. To meet these objectives, high quality palatants can help the nutritionists and feed formulators to optimise their feed formulation with more confidence in challenging situations. ■

References are available from the authors on request