How fibres can improve gut health in pullets and laying hens

Keeping layer flocks healthy, productive, and profitable by managing a healthy gut should be a daily concern. Increasing numbers of studies on intestinal health demonstrate that the microbiota is crucial for all species and this is also true in human health.

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A photograph of a good rearing flock. If you find no feathers, maybe it is a good idea to consider increasing the fibre within the feed as soon as possible (Marcel Berendsen, The Netherlands).

To maximise long-term production, the health of the bird's gut must be maintained. For this to be successful, microbiota is a trending topic, but nutrition for pullets and laying hens, especially fibres, should not be neglected.

A common mistake when something is not fully under control (feed or even laying house management) is first to add one or two additives. In the vast world of additives, many of them could improve gut health: pre/probiotics, acids, medium or short chain fatty acids, plant extracts, essential oils, toxin binders.

It is necessary to keep in mind that any additive should always be tested under local conditions. Why? Because there are no bad additives. Nevertheless, one may not be 'the best' or optimal for your farm (or even for your flock) versus another one.

Local experimentation is the best way to test, compare and validate an additive. So, instead of spending money on additives, think of the simple rule of 'get back to basics' in terms of nutrition, which will be efficient and cheaper in many cases.

In terms of nutrition, the basics are working well in all conditions. For example, it is well known that an excess of protein intake will degrade faeces quality due to digestive disorders (mainly caused by fermentation).

An excess of chlorine will disturb water exchange at the gut level, and by consequence can imply wet droppings. In fact, not all but many nutrients can cause digestive disorders due to an excess or a deficiency. Therefore, respecting the right balance between feed intake and all the nutrients within the diet is the priority. Among these nutrients, which one could improve gut health? Maybe only one – fibre, especially insoluble fibres – by increasing gut movement, improving faeces quality and reducing fermentation.

Fibre characteristics

In contrast to protein, fibre content is not easy to characterise. According to the analytic method, the results are different. To illustrate this complex world, Acid Detergent Lignin (ADL) analysis represents the most part of lignin present inside a vegetable, but it could be only 80 or 90% of the real lignin inside this vegetable.

This is why many nutritionists do not speak about fibre, they prefer fibres. Fibres are part of the cell walls linked between them and not easy to cut by poultry enzymes inside their gut. This is why, to reduce the intestinal viscosity due to non starch polysaccharides (NSP) and soluble fibres, many nutritionists add NSP enzymes.

This improves the digestibility of the whole diet and increases energy intake (Table 1).

Another complexity is the solubility of all those fibres. Some are soluble and others are not. This is an essential point as according to their capacity (soluble or insoluble), their impact on poultry will be different. For nutrition, it is important to obtain a correct balance between insoluble and soluble fibres.

In fact, not enough or too much of one of the nutrients can lead to a lower performance (due to a classic quadratic response for many of them). Having the right balance is therefore a golden rule for all nutrients. To summarise, the main effects of soluble vs insoluble fibres are shown in Table 2.

Gut physiology

When there is an increase in fibre content, we recommend the insoluble fibres as the effects are more beneficial, especially on gut health or gut physiology. The particle size of fibres is also important, because insoluble fibres can have a mechanical effect on the gut (more motility, better villi height, deeper crypts, etc).

To get this effect in poultry, the size of insoluble fibres should be above 300µm, under this value there is no mechanical impact. Some studies show that in layers, feed particles over 1.5mm will stay longer in the gizzard than smaller sizes. So, according to feed presentation, it is important to provide the fibres in the largest size possible, even in pellet feed.

Transit

Large sizes of insoluble fibres will increase transit time and consequently optimise the digestibility of the entire ration. Insoluble fibres will stay longer in the gizzard inducing greater size and weight. Therefore, all the feed will stay inside longer and be more digestible.

That means all the nutrients within the formula will be used more efficiently.

This fact is crucial in growing birds as it enables good pullet quality with good gizzard capacity to be obtained. There is no advantage in increasing the gizzard capacity at 60 weeks of age.

Moreover, correctly timing pullet body weight is essential to achieve good frame development (muscles, skeleton and organs, including gut). It enables the future laying hen to

Continued on page 17

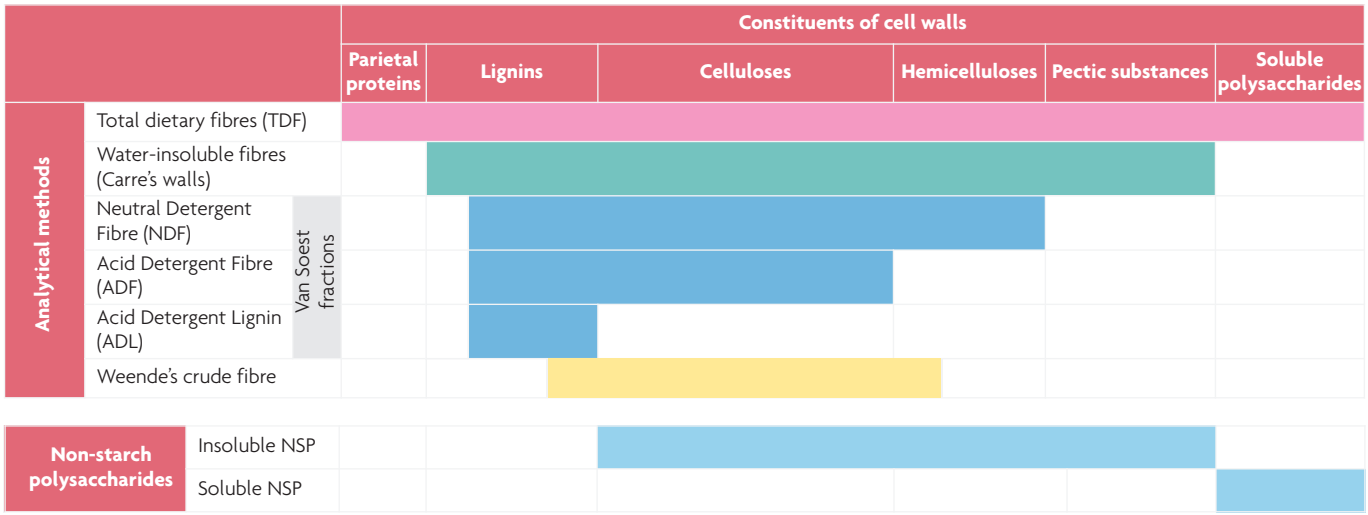

Table 1. To reduce the intestinal viscosity due to non-starch polysaccharides (NSP) and soluble fibres, many nutritionists add NSP enzymes. This improves the digestibility of the whole diet and increases energy intake.

Continued from page 15
develop a good appetite and reach high performances. Investing in pullet feeds with more fibre is profitable in term of laying hen performance.

Faeces

Another interesting point of insoluble fibres concerns faeces quality. Insoluble fibres catch free-water inside the gut and consequently in the faeces. This could be between one to five times their weight (which is a huge impact).

Less free-water and better faeces quality is always effective to prevent health issues from developing and keep birds comfortable. This is why we recommend more fibres in alternative systems to manage the litter and the behaviour of the birds more easily.

Behaviour

Moreover, providing a good laying house environment for laying hens, to make them comfortable under good conditions is crucial. An uncomfortable or stressed laying hen will stop producing earlier in many cases. Fibres can help in different aspects: calm the birds, achieve improved satiety, promote better feed and water intake.

Ultimately, there will be fewer behavioural disorders. Flocks will be under good conditions and easier to manage.

Furthermore, this is an essential aspect for long-term production, especially if birds are kept in production for 100 weeks. A good indicator regarding fibre needs is the feathers. In the picture of white pullets on the previous page, you can see many feathers on the floor.

Is this good or not? Pullets and laying hens will lose their feathers several times during their whole life. If you find no feathers on the floor in alternative systems; that means they were eaten.

It could chiefly be due to a lack of fibre within the feed (or a lack of methionine, etc) or too high a level of nervosity with a difficult to manage flock.

Vaccination

During the rearing period for pullets keep in mind that vaccinations are always stressful and challenging for the birds. Nonetheless, a well-designed prophylaxis programme is mandatory to protect the future laying hens against common diseases in the local area.

The way of administration for the vaccine should be checked regularly to ensure the expected protection.

For instance, administering a vaccine inside drinking water on a flock suffering with poor gut health will not be efficient. You must wait until they recover a healthy gut to get the best benefit out of the vaccination.

Recommendations

For all these positives effects, our laying hen guides recommend a minimum of crude fibre at 3.5% in cages and 4.5% in alternative systems. It seems that the maximum level of crude fibres without a negative influence in the literature should be around 7.0-7.5% for pullets and laying hens. This means that, under this level, any increase of crude fibres should or could be positive.

Crude fibre means mainly cellulose amounts (relatively easy to analyse and monitor), but keep in mind that splitting the amount and origin of fibres by three raw materials is better than using only one. This simple rule is also true for all nutrients, and helps maintain a healthy gut in the birds.

To achieve a healthy gut and maintain it as long as possible without any health issues, we advise the following: firstly, provide a feed well balanced in all the nutrients; secondly, adjust/increase the insoluble fibres (especially in pullet feeds) according to gut health and the bird's behaviour; thirdly, use additive(s).

In the future, better understanding of the microbiota, which seem to be influenced by fibres, could give rise to new tools for adjusting fibre content in the ration.

In conclusion, gut health management is still in its early days. Nevertheless, it is clear that a healthy gut enables better performance. A prevention strategy is more efficient in a long-term approach than trying to cure disorders.

In addition, if a gut/behavioural health issue appears in a flock, insoluble fibres can help solve or reduce it, especially if you respond rapidly.

In addition, it is always interesting to talk regularly with a local nutritionist and veterinarian to adjust the formula and the vaccination programme according to results in the field. This is the best way to improve gut health and, consequently, profitability. ■

Table 2. The main effects of soluble versus insoluble fibres.

Soluble fibres	Insoluble fibres
• Lowers intestinal passage rate, transit time faster. • Reduces digestion of fat, protein and starch. • Constitutes an energy source for monogastric animals. • Affects the viscosity of the digesta. • Is mainly made of fermentable parts. • Reduces faecal dry matter contents. • Binds nutrients (pectin), 'cage' effect reducing digestibility. • Potential prebiotic effect.	• Is a structuring fibre. • Accumulates in the gizzard, Regulates the passage of feed through the digestive tract. • Improves starch digestibility. • Increases intestinal passage rate, longer transit time. • Can only be poorly or not fermented. • Stimulates intestinal villi growth. • Does not constitute an energy source for young monogastric animals. • Increases faecal dry matter contents. • Orientation and development of the microbiota.