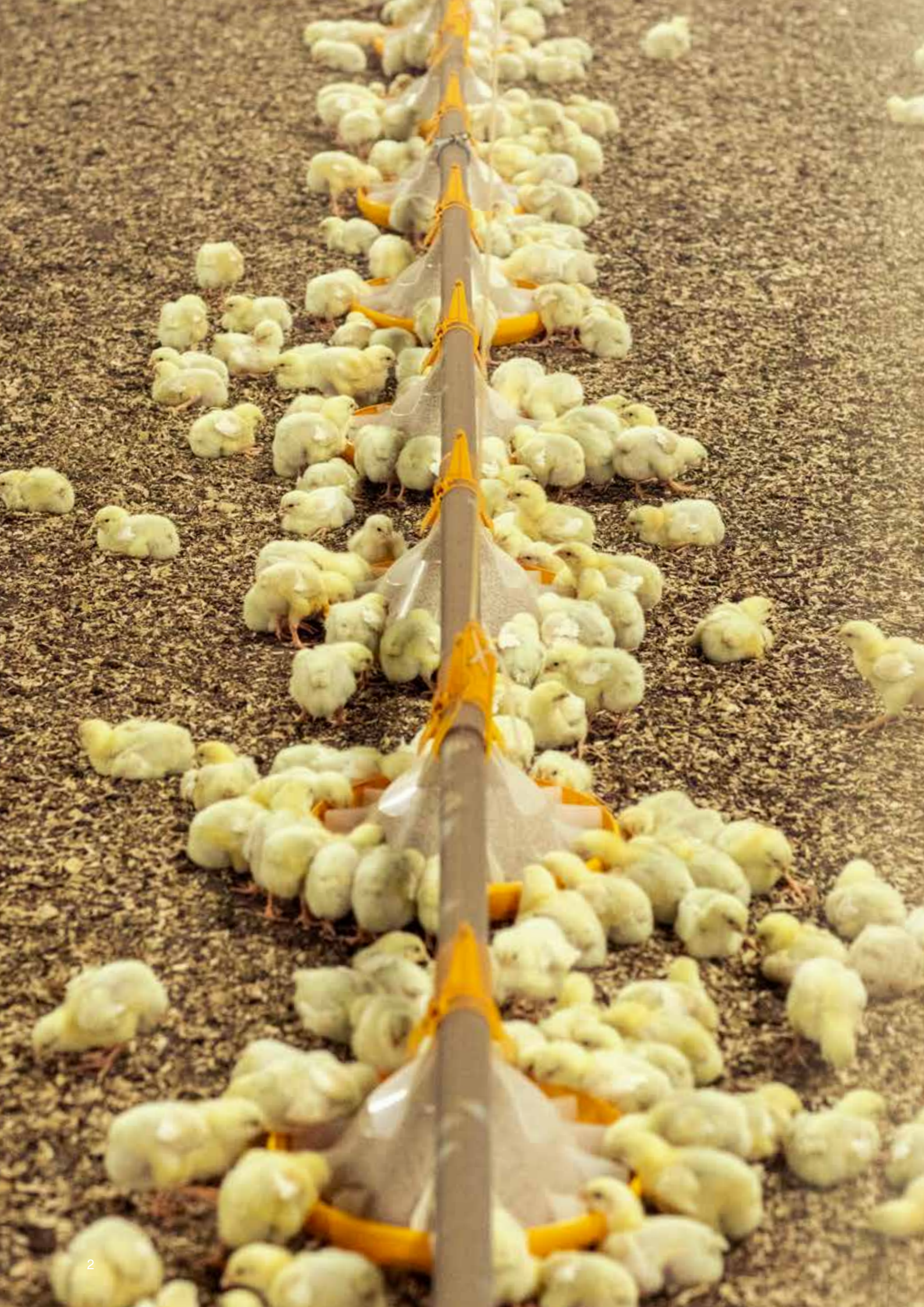
HAMLET PROTEIN®

A head start for *healthy broiler chickens*



Soy anti-nutritional factors do matter in chick feeding

Soybean meal (SBM) is indeed the preeminent protein source, with a remarkable amino acid profile, to meet the high protein and amino acid requirements of young chicks. However, the content of anti-nutritional factors (ANF's) in SBM, can seriously prejudice the development and functioning of the intestine of chicks during the starter period, compromising performance for the rest of their lives in different ways.

The most risky ANF's for young chick feeding are trypsin inhibitors (TIA), the indigestible galacto-oligosaccharides stachyose and raffinose, and the antigen beta-conglycinin, since they really compromise intestinal function and health in birds:

- Stachyose and raffinose: digestion not feasible and partial fermentation in chicks less than 14 days old, resulting in diarrhea, wet litter and most probably footpad dermatitis.
- TIA: trypsin deficiency during the first ten days of life. High TIA in feed further impairs dietary protein digestibility, growth and gut health.
- Beta-conglycinin: small capacity of young chicks to destroy beta-conglycinin from feed, triggering epithelial inflammation.

Processing of soy can reduce the adverse effects caused by ANF's and heat treatment is an often-used method and includes toasting, extrusion, and steaming. In fact, heating in excess effectively inactivates ANF's by denaturing protein structures. However, excess heating, besides inactivating ANF's, simultaneously results in loss of amino acid digestibility by the formation of irreversible complex bindings between reduced sugars and amino acids also known as the Maillard reaction. Furthermore, not all ANF's are inactivated due to heat.

An efficient methodology to be used in combination with heat is state-of-the art enzymatic treatment to fully inactivate soy ANF's. The use of specific enzymes avoids the need for high and extended use of heat, resulting in a soy protein ingredient that allows young birds to explore the full energetic and nutrient potential.

Soy ANF's stunt chicks!

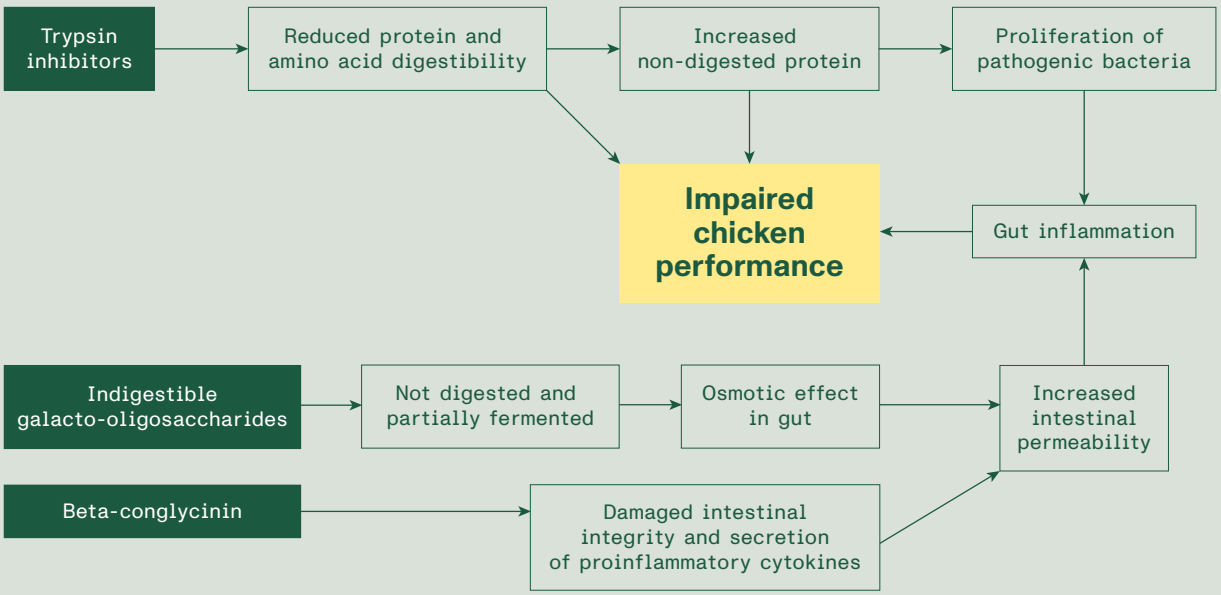


Figure 1. Effects of soy ANF's in broiler chickens.

Young chicks deserve ANF-cleaned soy protein!

Hamlet Protein products are unique protein sources that contain extremely low levels of ANF's due to a cutting-edge enzymatic treatment. Therefore, Hamlet Protein products minimize ANF-related gut impairments in young chicks. By replacing part of SBM in both corn- and wheat-based starter feed (0-10 days of life) with Hamlet Protein's enzyme-treated soy protein, chicks continue to show improved gut development and protein digestibility throughout their lives (figure 2).

Hamlet Protein *enhances gut development and nutrient digestibility!*

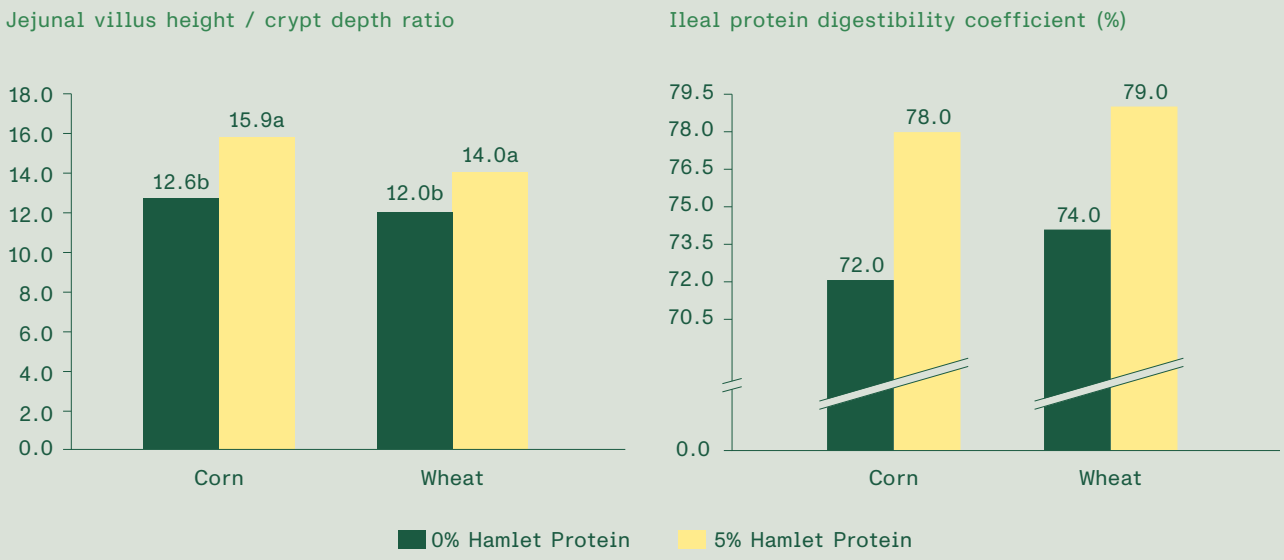


Figure 2. Replacement of part of SBM in starter feed with 5% Hamlet Protein enzyme-treated soy protein improves gut development and protein ileal digestibility in chickens. Data with different subscripts are significantly different (P<0.05). Source: Iji and Swick, 2014

"Protein digestive kinetics" matter in chick feeding

"Protein digestive kinetics" are defined as the **digestion of protein and the resulting absorption of amino acids from the gut lumen, and their transition across enterocytes to enter the portal circulation**. This comprehensive definition considers the extent, rate (speed) and site of nutrient digestion along the small intestine and the subsequent bioavailability of amino acids.

The time elapsed between the feed ingestion and the amino acid release from the enterocytes into the blood is crucial for an optimal metabolic use of the digestible protein. Fast protein sources are mainly absorbed in the proximal part of the small intestine, resulting in a higher proportion of dietary amino acids deposited in tissues as body protein (figure 3, left). Slow protein sources are mainly absorbed in the distal part of the small intestine, resulting in a higher proportion of dietary amino acids excreted as uric acid and ammonia (figure 3, right). Thus, the rate and site of protein digestion is crucial for bird performance; the performance of chickens being improved with rapidly digested protein sources.

Dietary protein digestive kinetics is decisive during the early stages of life. During the first 8 days of life in chicks, proliferation and differentiation of satellite cells in muscles reach their highest level. Satellite cells are essential for normal postnatal muscle growth, being the basis of muscle development throughout the rest of their life. Any factor that affects the accumulation of satellite cells during the early growth phases will dictate long-term muscle growth. Besides various hormones and growth factors, amino acids that reach the muscles via the blood are activators of satellite cells, which highlights the great importance of the speed of dietary protein hydrolysis.

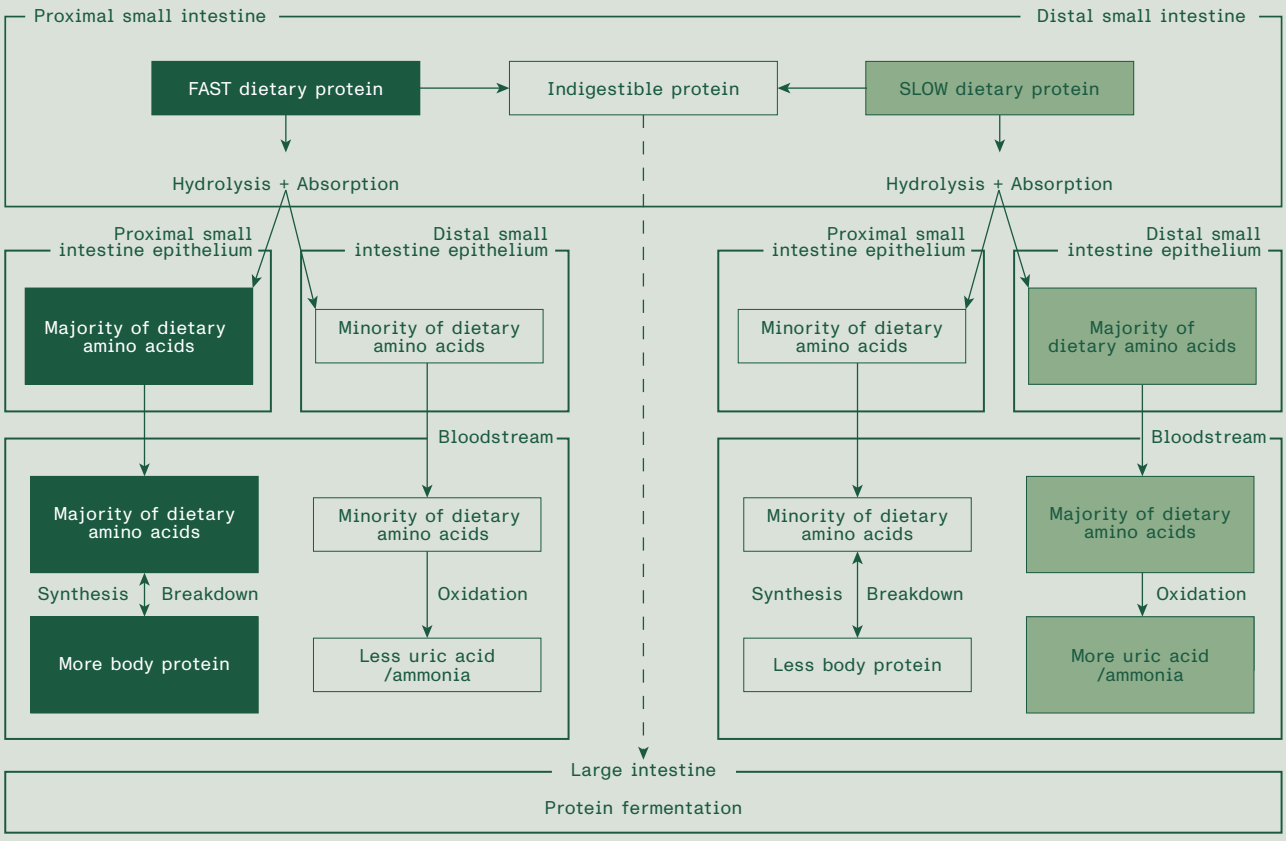


Figure 3. Protein digestion processes of a fast (left) and a slow (right) protein source in different small intestine sites.

Young chicks also deserve *fast dietary protein!*

Hamlet Protein products have extraordinarily advanced protein digestive kinetics than other protein sources commonly used in poultry feed. By including Hamlet Protein in broiler starter diets, protein hydrolysis rate of the whole diet is increased (figure 4) and chicken body weight is increased through the whole production cycle (figure 5).

Figure 4. Protein hydrolysis rate konstant (k) of Hamlet Protein- and SPC-supplemented broiler starter diets. Different letters indicate significant differences between dietary treatments (P<0.05)

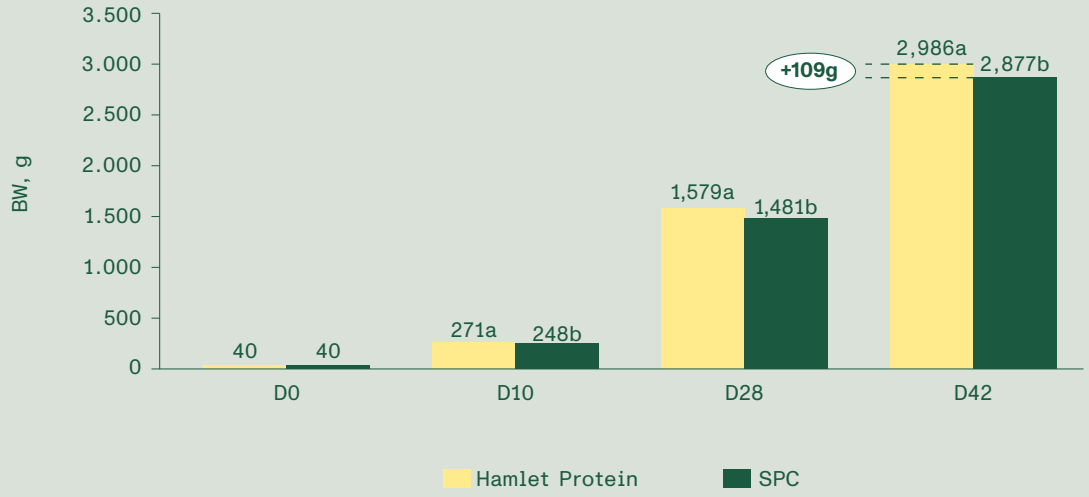


Figure 5. Body weight of Hamlet Protein or SPC fed chicks. Different letters indicate significant differences between treatments (P<0.05)

Hamlet Protein helps alleviate footpad dermatitis in your flock

The amount of soy ANF's in feed not only affects protein digestibility and gut development but also affects intestinal health. In young chickens, an influx of undigested protein from the small intestine to the hindgut, due to high TIA activity, may cause a proliferation of non-beneficial bacteria and consequently diarrhea.

Moreover, chicks do not digest soy oligosaccharides. Thus, they pass through the small intestine undigested, exerting therefore an osmotic effect in the gastrointestinal tract until they are fermented. However, part of them is not fermented and consequently their osmotic effect is maintained over time, resulting in liquid feces, wet litter and, most probably, footpad dermatitis (FPD) issues.

This phenomenon can be aggravated by high dietary levels of beta-conglycinin, which undermines the integrity of the intestinal epithelium and induces sterile inflammations, expressing as different FPD lesion scores on farm most of the time (figure 6).

Ensuring the lowest possible soy ANF's content in (pre-) starter feed is a valuable tool to improve gut health and bird welfare. Thus, Hamlet Protein's poultry products are reliable protein sources for young bird diets to improve gut health, reduce litter moisture and end with less severity and incidence of FPD (figure 7).

Soy ANF's behind FPD in chickens!

Figure 6. FPD lesion score (Eichner et al., 2007)

Hamlet Protein *in starter diets reduces risk of diet-induced FPD!*

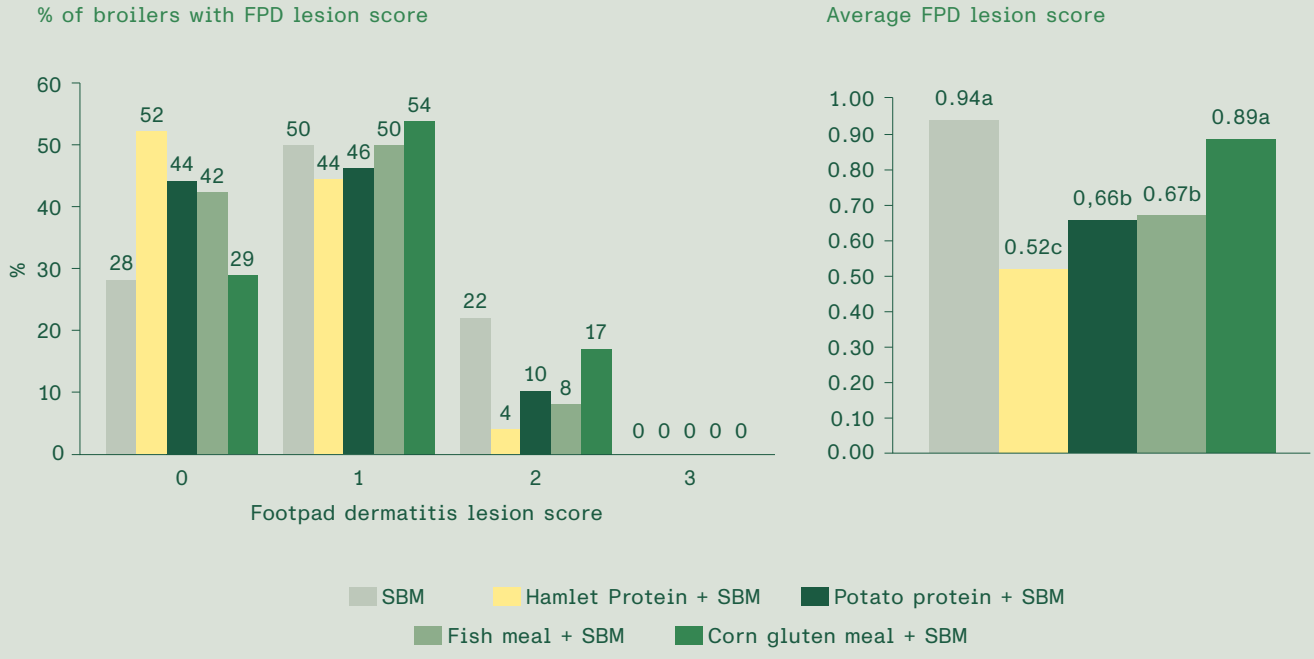


Figure 7. Effect of different dietary protein sources in starter feed on FPD incidence and severity on day 42 (incidence of each score -,%). Source: Bjedvov et al., 2015. Data with different subscripts are significantly different (P<0.05).

Antibiotic-free or coccidiostat-free? Reduce soy ANF content in your starter feed!

The improvement in intestinal health and development in chickens triggered by Hamlet Protein products and their low level of soy ANF 's will diminish feed-induced intestinal inflammations, which helps with the removal of antibiotics and the use of coccidiosis vaccines.

Thus, when comparing the inclusion of a Hamlet Protein enzyme-treated soy protein in starter diets with the addition of an antibiotic growth promoter (AGP) such as BMD in coccidiosis-vaccinated birds, the use of Hamlet Protein shows similar performance to that of AGP-fed birds (figure 8).

The positive effect of Hamlet Protein products in starter feed of antibiotic-free poultry production is even more evident in chickens suffering from a mild intestinal infection, such as pathogenic *Clostridium perfringens* subclinical enteritis. In this sense, the inclusion of Hamlet Protein's enzyme-treated soy protein in the starter feed or BMD through the entire feeding period equals the performance of *Clostridium perfringens*-infected broilers to that of uninfected birds (figure 9).

Hamlet Protein *can work wonders in ABF chicken production!*

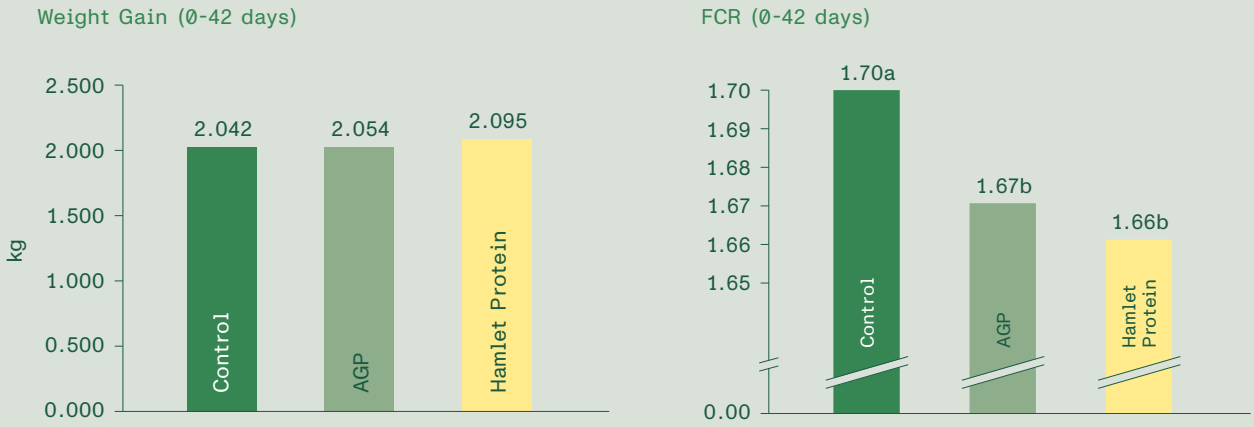


Figure 8. Effect of Hamlet Protein's enzyme-treated soy protein in starter diets versus AGP (BMD) during the overall rearing period on coccidiosis-vaccinated chicken performance. Data with different subscripts are significantly different (P<0.05). Source: Lumpkins et al., 2017.

Hamlet Protein *prepares your chicks to deal with intestinal disorders!*

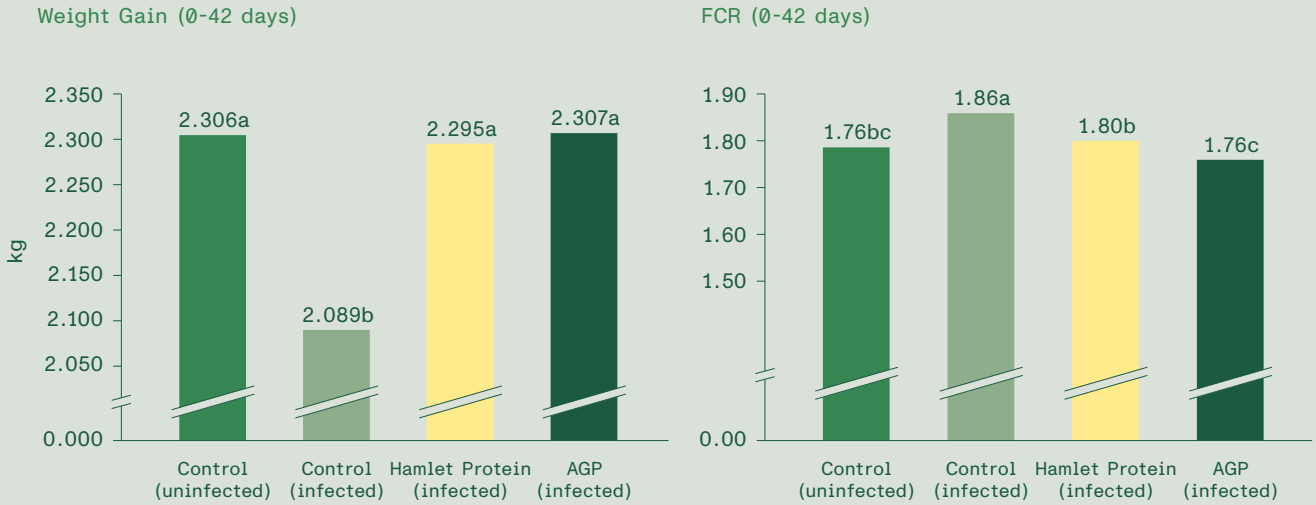


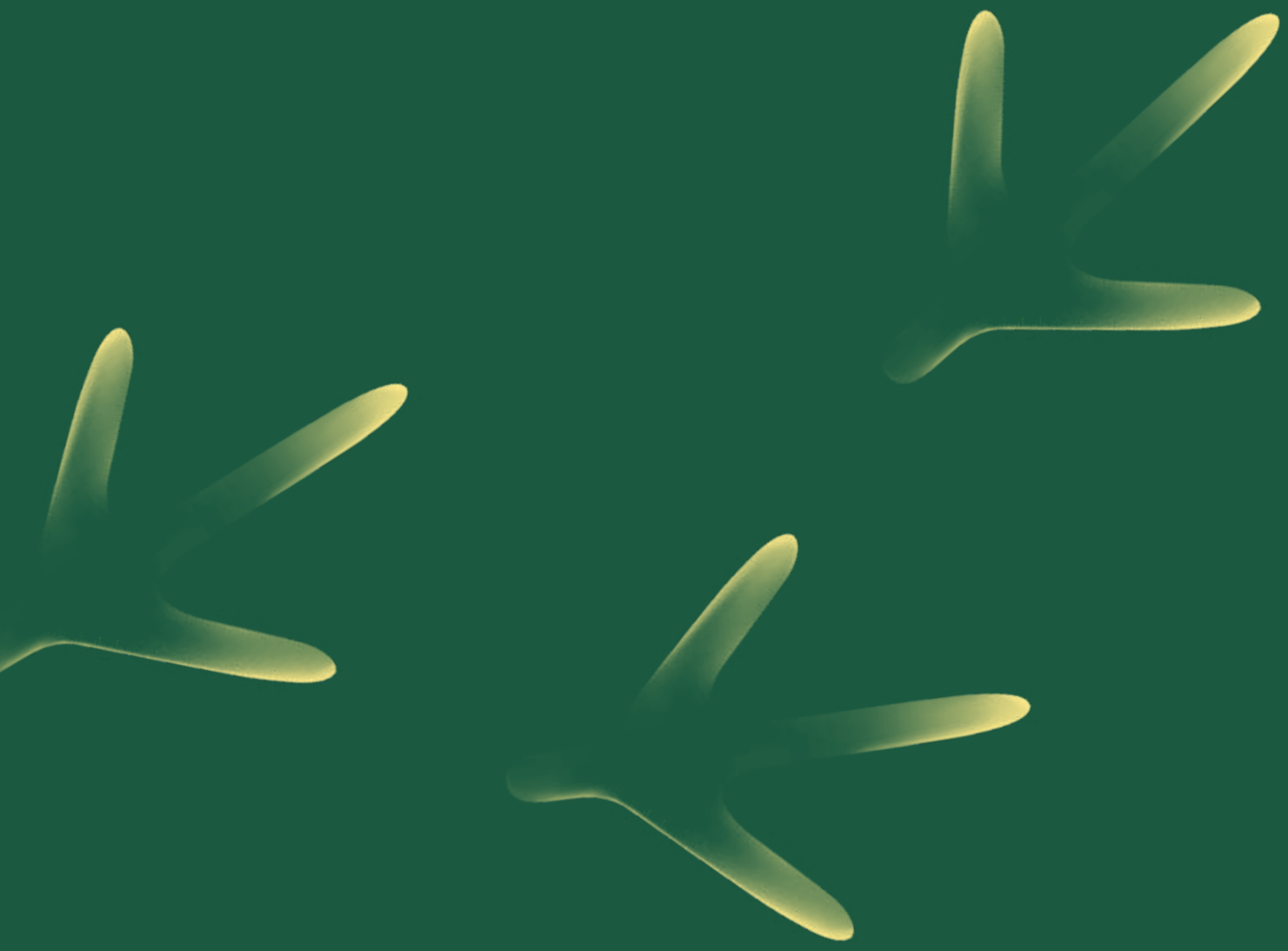
Figure 9. Effect of feeding Hamlet Protein's enzyme-treated soy protein in the starter feed or AGP (BMD) during the entire cycle on body weight and FCR of infected broiler chickens (0-42 days). Data with different subscripts are significantly different (P<0.05). Source: Rasmussen et al., 2019.

Invest in your starter feed protein and *get more reward at the end*

Numerous studies of Hamlet Protein's enzyme-treated soy protein in broilers show that the inclusion of this protein product in starter feed improves body weight gain between 0.5 and 2%, and FCR between 2 and 3% at the end of the production cycle, which always results in a ROI greater than 3:1.

ROI ≥ 3:1

The ROI of Hamlet Protein's enzyme-treated soy protein may be even more generous when they replace animal protein sources such as fishmeal or meat-and-bone-meal. Thus, Hamlet Protein's products are definitely protein sources of choice, as substitutes for animal proteins, in all-veg feeds.



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Healthy Animals - Healthy Business
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