

White Paper 2022 marketing campaign

Egg Production: Stepping Ahead with High-Quality Soymeal for Layers

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The poultry industry is evolving continuously as consumer demands for high-quality protein from meat and eggs increases worldwide. Given the high nutritional value of eggs, they are an affordable solution as an excellent protein source for millions of people across numerous, different cultures and geographical regions. Indeed, eggs are of particular interest from a nutritional point of view, gathering essential lipids, proteins, vitamins, minerals, and trace elements, while offering a moderate calorie source (about 140 kcal/100 g), great culinary potential, and low economic cost¹. In the last three decades, world egg production has increased by 150% according to the Food and Agriculture Organization². The production volume of eggs worldwide exceeded 86.67 million metric tons in 2020, up from 74.14 million metric tons in 2016³. This fact is aligned with increasing egg consumption which is forecast to reach 138M tons by 2030⁴.

In response to those trends, the poultry industry has shifted toward a highly specialized systems approach including, technological advances and improved management strategies. In addition to performance efficiency improvements (i.e. breeding and genetics), nutritional management strategies that support improved production should be explored. It should be paired with the application of strategies and selection of high-quality ingredients to guarantee optimal performance and egg and quality focused on a sustainable production. Laying hens are commonly fed diets containing corn and soymeal. The presence of anti-nutritional factors in the diet such as protease inhibitors may affect the overall digestibility of the feed by the hens and subsequent egg weight⁴. Therefore, the use of proper technologies to add value to protein and energy sources for animal feeding plays a fundamental role on defining that performance.

Soybeans contain a wide array of nutrients, and it is the protein and oil that are highly valued in terms of animal and human nutrition. Soybean products are fed to animals around the world to convert soy proteins and energy from oil into eggs for human consumption. When soybeans are processed using high-shear dry extrusion technology – a high temperature short time process that thoroughly deactivates anti-nutrients and promotes digestibility – in the animal’s diet, we have found an improvement in animal performance. Further, high-shear dry extrusion of soybeans followed by mechanical oil pressing to partially de-oil the extruded full-fat soy, adds nutritional value to soybeans and results in a chemical-free and highly digestible soy meal (ExPress® soy meal). Because the cells are thoroughly ruptured during the extrusion process, there is greater digestibility of amino acids when compared to commodity, solvent-extracted soybean meal.

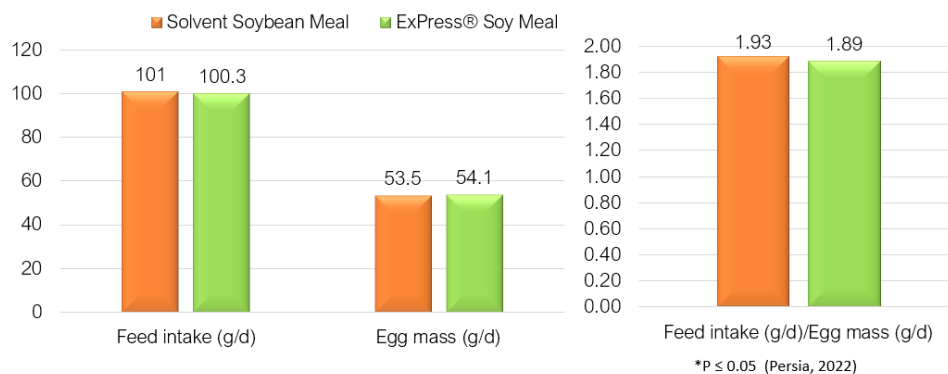
When ExPress® soy meal has been produced across a range of extrusion temperatures through high-shear dry extrusion, trypsin inhibitors have been properly deactivated at the proper



processing final barrel temperature (320 °F = 160 °C)⁵, amino acid digestibility has increased and animals performance is maximized ⁶. Properly processed ExPress® soy meal provides a complete ingredient supplying the bird with high-quality protein and energy sources – with 6%-8% residual oil left in the mechanically-processed meal. Despite a lower level of crude protein compared with solvent-extract soybean meal, ExPress® meal has elevated amino acid digestibility coefficients based on previous animal feeding studies.⁷ These aspects make ExPress® soy meal a unique and high-quality ingredient in many ways. Furthermore, feeding ExPress® soy meal to birds promotes protein digestibility resulting in enhanced conversion of soy protein into poultry meat and eggs. In summary, the nutritional advantages of properly processed ExPress® soy meal are an alternative for poultry feeding and as an excellent source of protein and energy⁷.

The superior digestibility of amino acids and true metabolizable energy of ExPress® soy meal with respect to solvent-extracted soybean meal has been demonstrated through research conducted by Dr. Carl Parsons’ laboratory at University of Illinois. Digestibility of most amino acids were increased when properly processed ExPress® soy meal was fed to broilers. Digestibility of methionine, cysteine, and lysine, which often limit performance in poultry, all improved with the use of this high-quality soy meal. Overall, ExPress® soy meal provides 2% more digestible amino acids and 589 kcal more of TMEn for poultry diets when compared to solvent extracted soybean meal.

The nutritional advantages of ExPress® soy meal were further demonstrated in a 2021 layer trial conducted at Virginia Tech University. The study evaluated production performance of 22–37-week-old laying hens fed ExPress® soy meal diets versus a control diet including solvent-extracted-soybean meal. There was an improved feed conversion in layers fed ExPress® soy meal compared to the solvent extracted soybean meal. Specifically, the feed intake of layers fed ExPress® soy meal was 0.7 g/day less feed and produced 0.6 g/day more egg mass resulting in an improvement of 2% in feed conversion as shown in the graph below. This means a potential impact on lowering the feed costs which would have a positive impact on profitability of poultry



operations. In addition, at the trial end, hen housed egg production (HHEP, does not account for hen mortality) and egg production corrected for mortality (hen day egg production HDEP) were similar between both groups. In terms of cost of egg production standpoint, HDEP is good as it measures the effects of both egg production and mortality⁸.

Egg quality traits were also evaluated in the Virginia Tech trial. Layers fed ExPress® soy meal had similar internal and external egg-quality traits across categories as shown in the chart below, except a slightly darker yolk when compared to those fed solvent-soybean meal (indicated with different superscripts). Although significant, that difference in color is barely perceptible. Also, it is important to point out that the color of the yolk depends to a large extent on carotenoids contained in plant seeds⁹.

Given that the egg quality of hens fed ExPress® was unaltered, it may be a viable option for producers who use this soymeal in layer diets to meet the growing consumer demand for more sustainable production (i.e. birds fed diets without the use of hexane-extracted soy or organically-farm eggs) and attend the consumer demand in that respect. It has been indicated that organic eggs contain higher nutritional value than conventional eggs¹⁰, which may indicate that organic eggs are relatively an alternative option for health-conscience consumers.

Ingredient (%)	Control SBM	ExPress® Soy Meal
Yolk color	6.7 ^a	6.9 ^b
Yolk weight, g	15.1	15.2
Albumin weight, g	34.8	34.8
Shell weight, g	6.06	6.04
Haugh Unit	87.75	88.01
Shell breaking, g	5038	5024

The high-shear dry extrusion and mechanical extraction of oil process – when processed properly – creates value-added to soy ingredients resulting in improved nutrient digestibility and feed efficiency. This leads to significant efficiency gains in egg production and promotes sustainable practices by maximizing efficient use of feed. Especially integrators can benefit from improved performance from birds fed high-shear dry extruded ingredients, particularly as the egg industry is addressing current pitfalls around conventional practices. The high input prices due to higher diet costs may push producers to focus on production yields, procurement, and efficiency in the value chain to reduce feed wastage and promote efficient labor use. Taken together, these insights are proving incredibly useful to egg producers as a tailored approach to take advantage of the nutritional benefits of ExPress® soy meal.

Recommendations:

- Use ExPress® soy meal to enhance feed conversion ratio.
 - Reduce the total amount of feed/layer
 - Less total feed and improved egg mass
 - Reduce feed costs
- Improve feed efficiency benefits without altering the egg quality
- Apply sustainable management practices, including the use of highly-digestible ingredients to reduce feed intake and promote better performance, to meet current consumer demands.

References

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