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## Impact of soybean molasses addition on pelleting process and pellet quality

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### Introduction

Soybean molasses is a by-product of the production of soy protein concentrate with a huge amount of carbohydrates, between 58-65% in dry matter basis, which is why it is similar to sugar cane and sugar beet molasses that are used in animal feed (Rakita et. al, 2021). Solubilized sugar presented in molasses may contribute to pellet physical quality due to recrystallization of sugar that enables better bonding of particles (Thomas et al., 1998). In this study, the authors present the results of the investigations in which the effects of addition of soybean molasses in model feed influences pelleting process and pellet physical quality.

### Materials and Methods

The model mixture for broilers was formulated (46.0% of corn, 22.5% of wheat, 22.5% of soybean meal and 9.0% of sunflower meal). The ingredients were ground by a hammer mill equipped with 3 mm sieve and then mixed using a twin-shaft paddle mixer. Soybean molasses was added during mixing process by a two-phase nozzle at three levels – 1%, 3% and 5%. The molasses was stirred with appropriate amount of water so that moisture content of mash prior pelleting was set at 15 and 17%, respectively. The 4 mm pellets were produced using a flat die pellet press. Specific energy consumption ( $E_{sp}$ ) of pellet press was recorded, while bulk density (BD), pellet hardness (H), and pellet durability index (PDI) of the produced pellets were determined.

### Results and Discussion

The addition of soybean molasses at level of 3 and 5% significantly decreased specific energy consumption of the pellet press for both 15% and 17% of moisture content of mash. No significant influence of soybean molasses addition on pellet bulk density was observed, except for 5% of addition when pelleting was done at 15% moisture. The pellet hardness was significantly lowered when soybean molasses was introduced in the feed. Although increase in molasses level decreased hardness, those changes were not significant. However, addition of 5% of molasses did significantly influenced PDI of samples by increasing it. The obtained results showed that addition of soybean molasses lowers the energy consumption of the pelleting process and results in product with higher durability but lower hardness when pelleting parameters are constant.

**Table 1.** Energy consumption of pelleting process and physical quality of pellets

Soybean molasses level in pellet	15% moisture prior pelleting				17% moisture prior pelleting			
	0%	1%	3%	5%	0%	1%	3%	5%
$E_{sp}$ (kWh/t)	34.8 <sup>c</sup>	29.8 <sup>b</sup>	27.9 <sup>ab</sup>	24.3 <sup>a</sup>	29.7 <sup>b</sup>	25.9 <sup>ab</sup>	24.6 <sup>a</sup>	23.7 <sup>a</sup>
BD (kg/m <sup>3</sup> )	662.7 <sup>b</sup>	663.9 <sup>b</sup>	666.1 <sup>b</sup>	653.4 <sup>a</sup>	642.1 <sup>a</sup>	637.7 <sup>a</sup>	640.4 <sup>a</sup>	646.4 <sup>a</sup>
H (kg)	10.9 <sup>b</sup>	9.8 <sup>a</sup>	9.0 <sup>a</sup>	7.8 <sup>a</sup>	10.4 <sup>b</sup>	8.5 <sup>a</sup>	8.1 <sup>a</sup>	8.2 <sup>a</sup>
PDI (%)	98.7 <sup>a</sup>	98.7 <sup>a</sup>	99.0 <sup>b</sup>	99.0 <sup>b</sup>	98.6 <sup>a</sup>	98.6 <sup>a</sup>	98.5 <sup>a</sup>	98.7 <sup>b</sup>

<sup>a</sup>Values with different letters in a same row are significantly different ( $p < 0.05$ );  $E_{sp}$ –specific energy consumption of pelleting; BD–bulk density; H–Kahl pellet hardness; PDI–pellet durability index

### References

- Rakita, S., Banjac, V., Djuragic, O., Cheli, F., Pinotti, L., 2021. Soybean Molasses in Animal Nutrition. *Animals* 11: 514. <https://dx.doi.org/10.3390%2Fani11020514>
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