



Effect of a Feed Additive based on *Papaveracea* Roots and Nanoclays on Broiler Performance

J.G. Vicente-Martínez, J.M. Pinos-Rodríguez, J.C. García-López¹,
V.R. León-Cabada, J.M. Martínez-Hernández, S. López-Aguirre

10.18805/ag.D-351

ABSTRACT

Background: Due to the resistance that various pathogens have developed to the unplanned use of antibiotic growth promoters (AGPs) and the risk to consumers health that this implies, AGPs could be replaced by natural products such as plants, essential oils or extracts. The current study was aimed to investigate the effects of a feed additive based on papaveraceae roots and nanoclays (Sangromix 10x®) on broiler performance.

Methods: One hundred and twenty Cobb broilers one d old, were randomly assigned to a diet without additive or with additive at 20 g/t during 49 d. Broilers had free access to concentrate and fresh water and were weighed daily. Feed intake and body weight was measured daily and were used to estimate average daily gain and feed conversion ratio.

Result: Broilers that received Sangromix 10x®, had higher final body weight, total gain, average daily gain and better feed conversion value as compared with broilers with no additive. The additive did not affect feed intake. The inclusion of Sangromix 10x® increased final body weight and improved feed conversion value and it can be concluded that is an efficient alternative for broiler production. Nevertheless, further research is required to determine their effect on meat and carcass quality, internal organs and blood biochemistry.

Key words: Average daily gain, Feed conversion, Feed intake, Final body weight, Sanguinarine.

In the last decade, the use of phytobiotics has increased, because of their pharmacological effects, it promotes feed intake, improve antioxidant status, increase the secretion of endogenous enzymes (Gheisar and Kim, 2018) change the fluidity and permeability of the cell membrane and the absorption of nutrients is enhanced (Amad *et al.*, 2011). In the case of *Papaveraceae* family, the alkaloids contained in it, mainly Sanguinarine, showed antimicrobial activity, anti-inflammatory, in rats, reduced the intestinal secretion caused by cholera toxin and improve liver function (Yu *et al.*, 2014). Another alternative of growing interest in animal production is the application of nanotechnology, their potential use in broiler production cannot be fully appreciated yet because of insufficient knowledge, however, it's known that it can reduce the time of production of meat and eggs (Al-Beitawi *et al.*, 2017; Hassanen *et al.*, 2020). The objective of this study was to investigate the effects of a feed additive based on papaveraceae roots and nanoclays on broiler performance.

All procedures were reviewed and supervised by a Bioethics Committee in accordance with the Official Mexican Regulations on Technical Specifications in the Production, Maintenance and Use of Laboratory Animals (DOF, 2001). During the period september to october 2020, at Instituto de Investigacion de Zonas Deserticas of Universidad Autónoma de San Luis Potosí, San Luis Potosí, México, one hundred and twenty, one d old, Cobb broilers were housed in a temperature-controlled room (25°C) and 24 h light cycle, 12 brooder battery cages (Petersime Inc., Gettysburg, OH) whit 10 chicks per cage were used. From day 1 to day 7 old, chicks were fed a starter concentrate

Facultad de Medicina Veterinaria y Zootecnia, Universidad Veracruzana, Veracruz, México.

¹Instituto de Investigacion de Zonas Deserticas, Universidad Autónoma de San Luis Potosí, San Luis Potosí, México.

Corresponding Author: S. López-Aguirre, Facultad de Medicina Veterinaria y Zootecnia, Universidad Veracruzana, Veracruz, México. Email: samuellopez@uv.mx

How to cite this article: Vicente-Martínez, J.G., Pinos-Rodríguez, J.M., García-López, J.C., León-Cabada, V.R., Martínez-Hernández, J.M. and López-Aguirre, S. (2021). Effect of a Feed Additive based on *Papaveracea* Roots and Nanoclays on Broiler Performance. *Agricultural Science Digest*. DOI: 10.18805/ag.D-351.

Submitted: 26-03-2021 **Accepted:** 15-09-2021 **Online:** 08-10-2021

(Iniciarina Hi-Broiler, Cargill, México) and from 8 to 49 d old, were fed a finisher concentrates (Engoordina Hi1, Cargill, México) (Table 1). Chicks were randomly assigned to six cages with feed without additive and 6 cages with additive. The additive based on *Papaveraceae* roots and nanoclays (Sangromix 10x®, Nutrición y Genética Saludable SA de CV, Leon Guanajuato, México) was added on top of the concentrate at 20 g t⁻¹ (as fed, 0.12g of sanguinarine). Broilers had free access to concentrate and fresh water. Broilers were weighed daily. Feed intake (FI) was measured daily as feed offered minus feed refused. Average daily gain (AGD) was calculated using body weight changes. Feed conversion ratio (FCR) was calculated as FI/ADG.

Data set were analysed in a completely randomized design with a mixed model (proc mixed), where treatment was considered fixed and broiler cage the random

Table 1: Chemical composition of commercial concentrate.

Item	Iniciarina %	Engoordinina %
Protein %	23	20
Total Energy (Mcal)	3.2	3.2
Ether extrac %	3	3
Fiber %	5	5
Mousture %	12	12
Ash %	8	8
Nitrogen free extrac %	51	51

Iniciarina, Hi-Broiler, Cargill, México; Engoordinina Hi1, Cargill, México.

Table 2: Effect of Sangromix 10x® on broiler performance.

Item	Sangromix 10x® g t ⁻¹		
	0	20	SEM
Initial BW (g)	57.7	52.9	0.89
Final BW (Kg)	2.112 ^a	2.477 ^b	0.34
Total gain (kg)	2.05 ^a	2.42 ^b	0.22
FI (kg)	5.27	5.20	0.32
ADG (g)	35.6 ^a	49.4 ^b	0.54
FCR	2.56 ^b	2.14 ^a	0.10

BW: Body weight; FI: Feed intake; ADG: Average daily gain; FCR: Feed conversion ratio; SEM: Standard error of means. ^{a-b}Means within rows with different superscripts are different at $P < 0.05$.

component in the model (SAS, 2008). The covariance structure used was ARH (1). Significant differences were accepted at $P < 0.05$. The results are shown as a general means.

Broilers that received Sangromix 10x®, had higher ($P < 0.05$) final body weight, total gain, average daily gain and better feed conversion value as compared with broilers without Sangromix 10x®. The additive did not affect ($P > 0.05$) feed intake (Table 2).

Aljumaah *et al* (2020) found that the inclusion of papaveracea extract in dried form at the rate of 0.20 g kg⁻¹, in liquid form at the rate of 0.25 mL L⁻¹ or Sangrovit Extra® (additive based on papaveracea roots whitout nanoclays) at the rate of 0.15 g/kg, did not show effect on body weight gain, feed conversion ratio and production efficient factor. The beneficial effects of papaveracea roots extract and nanoclays on final body weight, total gain, average daily gain and better feed conversion can be explained for the beneficial effect of nanoclays. Weiss *et al* (2006) mentioned that ingredients' nanoparticle size might increase the functionally or bioavailability of ingredients and nutrients, leading to increased body weight. In accordance with this,

Al-Beitawi *et al* (2017) found that the addition of 2% nanoclay minerals in diets of broilers chickens, significantly improved body weight gain and feed conversion ratio.

CONCLUSION

It may be concluded that nanotechnology as a new tool, nanoclays in combination with plants as feed additive, has the potential to improve the production of broilers without the health risks involved in the use of antibiotics as growth promoters. Further research is required to determine the effect of Sangromix 10x® on meat and carcass quality, internal organs and blood biochemistry.

REFERENCES

- Al-Beitawi, N.A., Shaker, M.M., El-Shuraydeh, K.N., Bláha, J. (2017). Effect of nanoclay minerals on growth performance, internal organs and blood biochemistry of broiler chickens compared to vaccines and antibiotics. *Journal Applied Animal Research*. 45: 543-549. <https://doi.org/10.1080/09712119.2016.1221827>.
- Aljumaah, G.R., Suliman, A.M., Abdulaziz, A.A., Alaeldein, M.A. (2020). Effects of phytobiotic feed additives on growth traits, blood biochemistry and meat characteristics of broiler chickens exposed to *Salmonella typhimurium*. *Poultry Science*. In press. <https://doi.org/10.1016/j.psj.2020.07.033>.
- Amad, A. A., Manner, K., Wendler, R. K., Neumann, K., Zentek, J. (2011). Effects of a phytogenic feed additive on growth performance and ileal nutrient digestibility in broiler chickens. *Poultry Science*. 90: 2811-2816. <https://doi.org/10.3382/ps.2011-01515>.
- DOF (Diario Oficial de la Federación) (2001). NOM-062-ZOO-1999. especificaciones técnicas para la producción, cuidado y uso de los animales de laboratorio. 22/08/2001.
- Gheisar, M.M and Kim, I.H. (2018). Phytobiotics in poultry and swine nutrition - A review. *Italian Journal of Animal Science*. 17: 92-99. <https://doi.org/10.1080/1828051X.2017.1350120>.
- Hassanen, E.I., Eman, A.M, Ahmed, M.H., Marwa, A.I., Khaled ,Y.F. (2020). The effect of different concentrations of gold nanoparticles on growth performance, toxicopathological and immunological parameters of broiler chickens. *Bioscience Report*. (3): BSR20194296. <https://doi.org/10.1042/BSR20194296>.
- SAS. (2008). Statistical Analysis System. Statistics Software. Release 9.1.3, SAS Institute, Inc., Cary, NC, USA.
- Weiss, J., Takhistov, P., McClements, J. (2006). Functional material in food nanotechnology. *Journal of Food Science*. 71: 107-116. <https://doi.org/10.1111/j.1750-3841.2006.00195.x>
- Yu, X., Gao, X., Zhu, Z., Cao, Y., Zhang, Q., Tu, P., Chai, X. (2014). Alkaloids from the Tribe Bocconieae (*Papaveraceae*): A Chemical and Biological Review. *Molecules* 19: 13042-13060. <https://doi.org/10.3390/molecules190913042>.