



Effect of Polyherbal Feed Supplements in Growing Pigs

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## Efficacy of Polyherbal Feed Supplements on Growth Performance and Nutrient Digestibility in Grower Pigs

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### ABSTRACT

The present experimental trial was conducted to determine the efficacy of different polyherbal feed additives on the growth performance and nutrient utilization of weaned piglets during grower phase. 30 weaned piglets were made into five groups and each group with six piglets were fed with common concentrate feed mixture (CFM) without any herbal feed supplement (T0), CFM with Restobal @ 15ml/day/animal once in three days mixed with feed (T1), CFM with Stresomix @ 250g/tonne (T2), CFM with Ruchamax(T3) and Nbiotic (T4) each @ 500g/tonne, respectively up to attaining of live weight about 35 kg. During the experiment, the daily feed intake as well as weekly body weight were recorded. Digestion trial at the end of study period was conducted for seven days to determine the nutrient digestibility. Addition of herbal feed supplements did not significantly ( $P>0.05$ ) influenced the initial, final body weights and feed consumption (kg/day) of pigs. Pigs supplemented with Nbiotic (T4) had significantly ( $P<0.05$ ) higher body weight gain during experimental period than pigs fed with control diet (T0). There was no significant difference ( $P>0.05$ ) between pigs fed with different herbal supplements (T1 to T4). A significant ( $P<0.05$ ) higher daily gain (g/day) was found in pigs supplemented with Stesomix (T2) and Ruchamax (T3) than pigs fed with control diet (T0). Among all experimental groups of pigs, pigs fed with Stresomix (T2) attained 35 kg body weight in 67 days only followed by T3 groups in 72 days, T4 and T1 groups in 73 days and T0 groups in 80 days. A significant ( $P<0.05$ ) higher crude protein digestibility was found in pigs fed with herbal feed supplements (T1 to T4) than control diet (T0). It was concluded that inclusion of polyherbal preparations like Stresomix and Ruchamax at appropriate dose with concentrate ration will improve the performance and nutrient digestibility in pigs without adverse effects on their health.

**KEYWORDS:** Growth Performance and Nutrient digestibility, Pigs, Polyherbal Supplements.

Article received: 22 June 2023; Article accepted: 31 July 2023

### Introduction

As compared to other species of livestock, pigs are more sensitive to high environmental temperatures because they are devoid of functional sweat glands in the skin and have a thick layer of subcutaneous fat over their bodies which greatly retard the escape of heat thus making these species highly sensitive to high temperature. This stress not only results in death but also significantly reduces the growth performance in both growing and finishing pigs. Antibiotics and chemotherapeutic drugs are the most frequently used performance enhancers in animal production. Overuse of antibiotic feed additives as growth promoters in food animals are dissuaded because of

apprehended development of antibiotic resistant bacterial strains and residual effect on the health of consumers (Chattopadhyay, 2014). During the last decades, phytogenic feed additives have been widely used as an alternative to antibiotics because of their plant derived property and growth-promoting effects (Ao et al., 2011). These plant products are used either single or in combination (polyherbs) to elicit better effect as medicine.

However, the data available on usage of various commercial polyherbal formulations on different species of livestock is lacking with respect to their dose and safety as feed supplement and research on the use of herbal medicines in swine is limited.

Hence, the present study was undertaken to find out the growth performance and nutrient utilization in the growing piglets by the use of herbal feed supplements like Restobal, Stresomix, Ruchamax and Nbiotic in weaned piglets.

## MATERIALS AND METHODS

Thirty crossbred LWY male pigs (75% inheritance) of 45 days of age and around 11.50 kg body weight were selected and divided into five

groups of six pigs each following completely randomized block design (CRD). All the pigs were housed in individual pens in a well-ventilated animal shed with the provision for individual feeding and watering. All the pigs were dewormed before the start of the trial. Five iso nitrogenous experimental diets were formulated as per NRC (2012) and were fed during grower (11-35 kg body weight) phase. The feed composition of grower phase was presented in (Table I).

Table 1. Ingredients and chemical composition (%) of experimental grower diets<sup>a</sup>

Constituents	T0	T1	T2	T3	T4
Maize	60	60	60	60	60
Soya bean meal	24	24	24	24	24
Deoiled rice bran	14	14	14	14	14
Salt	0.5	0.5	0.5	0.5	0.5
Mineral mixture	1.5	1.5	1.5	1.5	1.5
Lysine	0.09	0.09	0.09	0.09	0.09
Polyherbal feed additive		Restobal	Stresomix	Ruchamax	Nbiotic
Dosage		15ml/day/animal/ Once in three days	25g/100 kg	50g/100 kg	50g/100 kg
Proximate composition (%)					
Dry matter	91.0	90.0	90.3	90.6	90.3
Crude protein	18.2	18.2	18.5	18.4	18.3
Ether extract	1.84	1.82	1.93	1.94	1.78
Crude fiber	7.9	7.9	8.03	8.12	8.26
Nitrogen free extract	63.2	62.9	62.3	62.5	62.6
Total ash	8.9	9.1	9.2	9.0	9.1
Organic matter	91.1	91.1	90.8	91.0	90.9
DE(Kcal/kg)	3047	3023	3013	3030	3000
ME (Kcal/kg)	2940	2916	2905	2922	2894

T0= Pigs fed without any herbal supplements (Control) ; T1 = Pigs supplemented with Restobal.

T2 = Pigs supplemented with Stresomix ; T3 = Pigs supplemented with Ruchamax.

T4 = Pigs supplemented with Nbiotic

All groups were fed with common concentrate feed mixture (CFM) without any herbal feed supplement (T0), CFM with Restobal @ 15 ml/animal/day mixed with feed once in every three days. (T1), CFM with Stresomix @ 250g/tonne (T2), CFM with Ruchamax(T3) and Nbiotic (T4) each @ 500g/tonne respectively up to attaining of live weight about 35 kg or 3 months. All the five groups were offered respective experimental rations daily at 10 AM and 3 PM by weighing in electronic balance and residue was weighed after 24 h. The pigs with the live body

weight of 11–35 kg were fed with grower feed. The piglets were observed for clinical signs and mortality once a day. If any piglets were found dead, necropsy was carried out and findings were recorded. The beginning of experiment, piglets were weighed for two consecutive days in the morning before feeding and watering. There after piglets were weighed at weekly intervals during experimental period before feeding and watering to record the average body weight changes. The efficiency of feed was calculated as feed intake per unit gain.

The digestion trial was conducted for seven days on all 30 pigs at the end of grower phase to study the apparent digestibility of nutrients where total collection of faeces voided by each pig was done manually. Samples of feed ingredients, rations and faeces were analyzed in duplicate for proximate constituents (AOAC, 2005). Crude protein (N x 6.25) in fresh fecal samples was estimated.

### Statistical analysis

The data generated during the experimental period were analyzed through one way ANOVA by using SPSS statistical software (Version 22, Chicago, USA) and Mean±S.E. values were presented as per the procedures outlined by Snedecor and Cochran (1995) and significant differences in the means were expressed as P<0.05.

## RESULTS AND DISCUSSION

### Growth and performance

The efficacy of different herbal supplements on growth and performance of piglets during grower

phase was recorded (Table 2). The initial body weights (kg) of grower piglets were 11.50, 11.48, 11.28, 11.50 and 11.43 and final body weights (kg) were 35.28, 35.53, 35.50, 35.61 and 35.81, respectively for control (T0) and experimental group pigs (T1 to T4). Addition of herbal feed supplements did not significantly (P>0.05) influence both initial and final body weight of piglets. The body weight gain (kg) for control (T0) and experimental groups (T1 to T4) were 23.78, 24.05, 24.22, 24.11 and 24.38, respectively during grower phase. The body weight gain (kg) in pigs fed on Nbioic (T4) was significantly higher (P<0.05) than those fed on control (T0) and differences among other treatments were comparable. The number of days taken to reach 35 kg body weight was 80, 73, 67, 72 and 73 days, respectively for control (T0) and experimental groups (T1 to T4) of pigs. The pigs fed on herbal feed supplements had taken significantly less number of days (P<0.05) than those fed on control (T0).

Table 2. Effect of herbal feed supplements on growth and performance of grower pigs\*.

Characteristics	T0	T1	T2	T3	T4
Initial body weight (kg)	11.50±1.24	11.48±1.06	11.28±0.76	11.5±0.63	11.45±1.19
Final body weight (kg)	35.2±1.35	35.5±1.02	35.5±0.79	35.6±0.60	35.8±1.2
Weight gain (kg)	23.8 <sup>a</sup> ±0.18	24.0 <sup>ab</sup> ±0.22	24.2 <sup>ab</sup> ±0.06	24.1 <sup>ab</sup> ±0.11	24.4 <sup>b</sup> ±0.24
No. of days	80 <sup>b</sup> ±1.66	73 <sup>a</sup> ±3.11	67 <sup>a</sup> ±2.4	72 <sup>a</sup> ±2.07	73 <sup>a</sup> ±1.47
Daily gain (g/d)	298 <sup>a</sup> ±0.09	328 <sup>ab</sup> ±0.01	361 <sup>b</sup> ±0.012	335 <sup>b</sup> ±0.09	331 <sup>ab</sup> ±0.08
Feed consumption (kg/d)	1.14±0.03	1.20±0.07	1.22±0.04	1.17±0.06	1.19±0.04
FCR	3.84 <sup>b</sup> ±0.04	3.63 <sup>ab</sup> ±0.05	3.39 <sup>a</sup> ±0.04	3.51 <sup>a</sup> ±0.17	3.56 <sup>ab</sup> ±0.07

Means bearing different superscripts in a row differ significantly (P<0.05) (\*n=6)

T0= Pigs fed without any herbal supplements (Control) ; T1 = Pigs supplemented with Restobal

T2 = Pigs supplemented with Stresomix ; T3 = Pigs supplemented with Ruchamax

T4 = Pigs supplemented with Nbioic

The average daily gain (g/d) obtained was 298.3, 328.3, 361.1, 335.0 and 331.7 g, respectively for control (T0) and experimental groups (T1 to T4) during grower phase. The daily gain (g/day) in pigs under T2 and T3 groups were significantly higher (P<0.05) than those in control (T0) group and no significant (P>0.05) difference was observed among other groups. The average daily feed consumption (kg) for control (T0) and experimental groups (T1

to T4) were 1.14, 1.20, 1.22, 1.17 and 1.19, respectively. There was no significant (P>0.05) difference among the treatment groups (T0 to T4). The feed conversion ratio (FCR) was 3.84, 3.63, 3.39, 3.51 and 3.56, respectively for control (T0) and experimental groups (T1 to T4). The FCR was significantly (P<0.05) better in pigs fed on T2 and T3 than those fed on control (T0). However, the feed consumed/kg gain was comparable between

other treatments. The growth and performance of the pigs during grower stage was in the order of T2 > T3 > T4 > T1 > T0.

The better growth and performance in the polyherbal supplemented groups of pigs might be due to improved digestibility of nutrients, because herbs and herbal products could control and bound the growth and colonization of several pathogenic and non-pathogenic species of bacteria in the gut. This might lead to a better efficiency in the consumption of feed, resulting in improved growth and feed efficiency and also herbs could stimulate appetite, regulate digestion and metabolism in livestock and have growth promoting efficacy. Restobal liquid contains *Phyllanthusemblica*, *Terminaliabellirica*, *Allium sativum*, *Zinziberofficinale*, *Trychyspermum* etc and medicinal properties of these plant materials were reported by various researchers earlier (Kumar et al., 2013; Varsha et al., 2013). These plant materials are scientifically well proven to possess potent antioxidant, anti-stressor, haemopoietic, rejuvenating and performance enhancing properties.

Stresomix is a potent herbal formulation, which contains 28 different herbs and some minerals. The ingredients of Stresomix include *Ocimum sanctum*, *Withaniasomnifera*, *Tribulusterrestris*, *Mangiferaindica*, *Asparagus racemosus* and *Phyllanthusemblica*. Increase in body weight in Stresomix supplemented group (T2) might be because of its ingredient herbs viz. *Mangiferaindica* reported to possess growth promoting activity. The improvement in FCR in Stresomix supplemented group (T2) might be because of its herbs viz. *Ocimum sanctum*, *Phyllanthusemblica* and *Withaniasomnifera* reported to enhance feed utilization (Kale et al., 2014). Ruchamax contains *Phyllanthusemblica*, *Terminaliabellirica*, *Allium sativum*, *Zinziberofficinale*, *Trychyspermum* and other substances. Certain constituent herbs have been scientifically proven to have appetizer, restorative,

carminative, stomachic and tonic properties. Ruchamax's components, such as *Allium sativum* and *Zingiberofficinale* have been reported to be good appetizers and stomachics (Walia et al., 2011). Nbiotic is an ideal combination of essential oils and secondary plant metabolites. The principal elements of this composition are herbs such *Allium sativum*, *Zingiberofficinale*, *Cichoriumintybus*, *Eruca sativa*, *Eucalayptus globulus*, *Trigonella foenumgraecum*, *Cinnamomum camphora* and *Menthapiperata* as well as essential oils such as *Trychyspermum*. Terpenoids, alkaloids, flavonoids, bitters, and tannins are among the secondary plant metabolites found in these herbs. They, when combined in a synergistic manner via polyherbal formulation, operate as a natural growth stimulant. The most significant advantage of natural growth promoters over antibiotic growth promoters is that they pose no risk of bacterial resistance or undesired residue in animal products (Chattopadhyay et al., 2014). The obtained results in this experiment were in accordance with the findings of Kolodziej-Skalska et al. (2017), Roopa et al. (2017), Jung et al. (2019), Dang et al. (2020), Cheng et al. (2020), Davila-Ramirez et al. (2020), Sampath et al. (2020) and Sun and Kim (2020) in different species of livestock.

### Nutrient digestibility

The data on the digestibility of nutrients in control (T0) and experimental groups (T1 to T4) during grower phase were recorded (Table 3). During grower phase, the dry matter (DM) digestibility was significantly ( $P < 0.05$ ) higher in T2 supplemented group when compared to control (T0) and the differences among other groups were comparable. A significant ( $P < 0.05$ ) higher crude protein (CP) digestibility was found in pigs supplemented with herbal formulations (T1 to T4) than pigs fed with control diet (T0). The digestibility of crude fiber (CF), ether extract (EE), nitrogen free extract (NFE), organic matter (OM) were not significantly ( $P > 0.05$ ) different among treatments (T0 to T4).

Table 3. Effect of herbal feed supplements on nutrient digestibility of grower pigs\*

Nutrients	T0	T1	T2	T3	T4
Dry matter	72.8 <sup>a</sup> ±2.17	77.3 <sup>ab</sup> ±1.31	81.5 <sup>b</sup> ±1.55	76.4 <sup>ab</sup> ±2.07	76.6 <sup>ab</sup> ±2.35
Organic matter	76.3±1.72	77.6±0.93	76.7±1.40	76.8±1.33	77.2±1.61
Crude protein	74.5 <sup>a</sup> ±0.40	79.3 <sup>b</sup> ±0.86	81.0 <sup>b</sup> ±0.48	80.1 <sup>b</sup> ±1.3	79.08 <sup>b</sup> ±0.93
Crude fiber	42.31±1.31	39.73±1.00	38.34±1.86	38.95±1.36	39.04±2.08
Ether extract	58.50±2.17	57.43±2.09	56.70±2.19	56.31±1.77	55.85±1.90
Nitrogen free extract	80.77±1.71	83.33±1.51	82.27±1.36	81.54±0.84	83.54±1.37

Means bearing different superscripts in a row differ significantly ( $P < 0.05$ ) (\*n=6)

T0= Pigs fed without any herbal supplements (Control) ; T1 = Pigs supplemented with Restobal.

T2 = Pigs supplemented with Stresomix ; T3 = Pigs supplemented with Ruchamax.

T4 = Pigs supplemented with Nbiotic

The highest digestibility of DM and CP were observed in T2 supplemented group followed by other polyherbal supplemented groups compared to control. Regarding herbal feed additives, a wide range of species, herbs and extracts have been demonstrated to improve digestive tract function by increasing the activity of digestive enzymes of gastric mucosa and nutrient utilization of livestock (Chrubasik et al., 2005). The improved digestibility in the present study may suggest a positive influence of active substances present in the herbs on the metabolism in the pigs, their improved digestive processes and nutrient metabolism and as a consequence, higher performance indices. Similar trend was observed by Suryanarayana and Ramana (2011), Zhao et al. (2016) and Lei et al. (2018). Contrary to the present findings, Cheng et al. (2020) reported that the apparent total tract digestibility of DM, N was not affected by supplementing the pigs with either 0.5 g/kg or 1 g/kg herbal extract mixture compared with control ( $P > 0.05$ ).

## CONCLUSION

Based on the obtained results, it can be concluded that pigs fed with Stresomix (T2) and Ruchamax (T3) were showed better growth performance than the pigs fed with Restobal (T1) and Nbiotic (T4) although no significant difference was observed between them. Hence, Polyherbal preparations could be used as an alternative to antibiotic growth promoters in pigs without adverse effect on their health.

## ACKNOWLEDGEMENT

The authors are highly thankful to M/S AYURVET LIMITED, Himachal Pradesh, India, for financial support to carry out the research work and ICAR- AICRP on pigs for providing necessary facilities.

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