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USE OF SPRAY DRIED BLOOD PLASMA FOR RECOVERY OF LOW VIABILITY PIGLETS IN NURSERY

Abstract: The study objective was to evaluate if spray dried blood plasma (SDP) supplementation on commercial feed aids growth recovery of low viability weaned piglets during the nursery phase. Two hundred low viability piglets weaned at 21 days of age were allotted by body weight (BW) group (low versus medium BW) to two treatment groups (Control or SDP) with 50 piglets equally balanced by sex in each pen. The piglets were fed the same standard commercial pelleted-form diets for the initial 28 days of the study without SDP in the formula. For the SDP group, 15 g of SDP/pig/day was hand-mixed into the feed for the first 14 days, followed by 10 g of SDP/pig/day for the subsequent 14 days. During days 28 to 37 of the study all pigs were fed a common pelleted feed with no additional SDP provided. Individual BW was recorded, and blood samples were collected on days 1, 14, 28 and 37 of the study. Body weight of SDP group piglets was 13.10% higher at 28 days and 17.61% higher at 37 days ($P<0.01$) compared to the control group. Final BW at day 37 for the control group was 15.79 kg versus 18.57 kg for the SDP group. Piglets provided SDP were 11.58% more efficient in weight gain to feed intake ratio during the first 14 days compared to the control group. Pigs in the SDP group had lower ($P<0.05$) plasma urea nitrogen than the control group on day 28. In conclusion, supplementing SDP into commercial feed provided to low viability piglets increased BW gain, and feed efficiency in the nursery phase and is a viable strategy to aid growth recovery of low viability nursery piglets.

Keywords: weaning; weight gain; plasma urea nitrogen; piglet viability; spray dried plasma.

Introduction: In commercial systems, many factors can compromise the growth and development of the pig before weaning, such as low colostrum intake, large litter size, environmental conditions and exposure to pathogens resulting in lower BW at weaning. Pigs with lower BW at weaning usually require more time to achieve market weight and have higher mortality rate than heavier BW pigs. After weaning pigs are further subjected to additional stressful factors, including separation from the sow, mixing of litters, and abrupt changes of environment and diet. Collectively these factors increase the susceptibility of pigs to pathogens and compromise longer term growth performance and intestinal health (GRESSE et al., 2017). Spray dried blood plasma (SDP) is a functional feed ingredient rich in high-quality proteins such as albumin, gamma globulins (IG) and essential nutrients that support pig growth and immune system development (BALAN et al., 2021). Therefore, the objective of this study was to evaluate the performance and biochemical responses of supplementation of SDP in commercial nursery feed on the growth recovery of low viability weaned piglets during the nursery phase.

Material and Methods: At a commercial farm, 200 genetically homogeneous low viability weaned pigs were placed at 21 days of age in the nursery into 4 pens by BW category (low or medium) and assigned to two treatment groups (Control or SDP). Each pen contained 50 pigs equally balanced by sex. Low BW category pigs had an initial average BW of 3.6 ± 0.5 kg and medium BW category pigs averaged 4.5 ± 0.50 kg. Piglets assigned to the SDP treatment, received 15 g SDP/pig/day that was hand-mixed on the commercial pelleted feed during the first 14 days after weaning followed by 10 g SDP/pig/day during the following 14 days. During day 28 to 37 of the study, both groups were provided pelleted commercial feed without any supplemental SDP. The water supply was provided *ad libitum*. Individual weighing of the pigs was done on day 1, 14, 28 and 37 of the study. Pig growth parameters were evaluated based on individual pig BW, while feed intake and feed efficiency results were based on daily pen recorded feed disappearance. On day 1, 14, 28 and 37 of the study 5 mL of blood was collected from the cranial vein while the pigs were restrained in the supine position with the neck extended and the front paws held backwards. Blood samples were centrifuged at 3000 rpm for 10 minutes. The serum was placed in microtubes and kept in a freezer at -20ºC for subsequent analyses of urea, total proteins and albumin using specific commercial kits (Analiza®), and the reading was done using a semi-automatic biochemical analyzer (Bioplus 2000®). Globulin

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levels were obtained by calculation where globulins = total proteins - albumin protein. The data was submitted to ANOVA and comparison of means by Tukey at 5% significance using the Minitab® 19 (2020) statistical package.

Result and Discussion: In Figure 1, low viability pigs provided supplemental SDP during the first 28 days showed higher feed intake and BW ($P<0.05$) at the end of nursery. Specific declines in daily feed consumption were associated with the dietary phase feed change dates in the farm protocol. Males fed SDP were 12.5% heavier (at 14 d of the study) compared to control and SDP females were 16.3% heavier (at 14 d of the study) compared to control females. At the end of the study (day 37), SDP pigs had 17% higher average BW than the control group. The feed efficiency of SDP piglets was 11% higher than that of control pigs. These results indicate that plasma supplementation had a positive impact on the recovery of pigs, favoring their development. Plasma levels of total protein, albumin and globulins were not ($P>0.05$) changed between groups. Plasma urea levels were lower ($P=0.08$) for piglets fed SDP on day 28. The reduction in urea levels for the SDP group is associated with the degradation of amino acids, indicating a reduced need for protein catabolism due to the presence of easily absorbable nutrients from SDP (JIANG et al., 2000). These nutrients are metabolized more efficiently by the pig, requiring less protein catabolism to obtain energy. Furthermore, SDP is a source of functional proteins such as transferrin, growth factors and immunoglobulins that improve intestinal barrier function and reduce inflammatory processes in animals under challenge conditions (CAMPBELL et al., 2019).

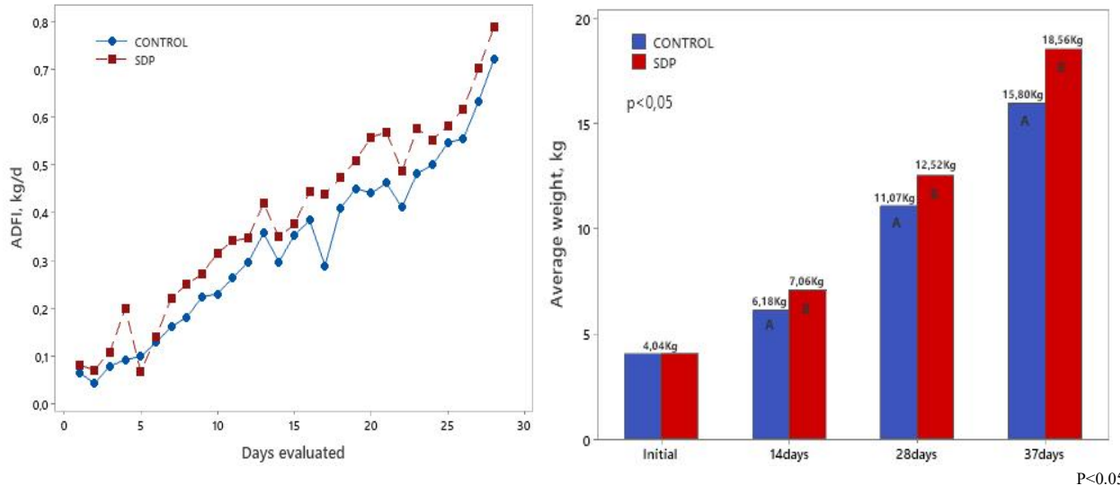

Figure 1. Daily feed consumption and average body weight of nursery pigs receiving control (CON) and spray dried plasma (SDP) treatments.

Conclusion: The supplementation of spray-dried blood plasma on commercial nursery feed is a viable strategy to aid growth recovery of low viability, lower BW weaned pigs.

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