

Benefits of spray dried porcine plasma (SDPP) on post-weaning performance of piglets in the absence of prophylactic antibacterial medication

W. Merckx¹, S. Massart¹, I.D. Kalmar²

¹Zootechnical Center, KU Leuven, Lovenjoel, BE; ²Veterinary R&D, Veos group, Zwevezele, BE

Introduction

Abrupt cessation of lactogenic passive immunity and post-weaning anorexia in piglets are major factors in the multi-factorial etiology of diarrhea and/or a transient weight dip following weaning (Campbell et al., 2010). Dietary spray-dried porcine plasma (SDPP) is an alternative source of lactogenic immunoglobulins and other beneficial glycoproteins that are present in sow's milk and protect the gut mucosa of suckling piglets against enteric infections. In addition, dietary SDPP generally enhances early post-weaning feed intake and weight gain (Van Dijk et al., 2001; Torrallardona, 2010). Present studies examined the effects of SDPP in pre-starter and starter diets on piglet performances over the entire weaning period under conditions of absence of prophylactic use and with minimal therapeutic use of antibiotics. Both, regular SDPP and HAT-pasteurized SDPP¹ were tested.

Material and Methods

In two trials, 18-day-old piglets were stratified per weight category (light, medium and heavy) into pens per 10 piglets that were randomly assigned to one of two dietary test groups. Sample size was 160 piglets with N=8 (pens) in Trial 1 and 120 piglets with N = 6 in Trial 2. In both trials, soy protein was partially replaced by SDPP on an iso-nitrogenous and iso-caloric basis. The test diets were formulated to be similar in digestible lysine and macro-mineral contents. In trial 1 (performed during winter), SDPP of 80% crude protein content as is (Actipro® 85 PPS) was used in the pre-starter diet (d0-13) at a dose of 3%. In trial 2 (spring), HAT-SDPP of 70% crude protein as is (Actipro® 75PPSP) was used in the pre-starter (d0-14) and starter diet (d14-28) at a dose of 4% and 2%, respectively. Afterwards, a control starter/grower diet (d13-43) and a control grower diet (d28-41) were fed to both test groups of Trial 1, respectively, Trial 2. Live weigh and feed intake were measured at regular intervals. Mortality was recorded daily. Use of antibiotics was limited to therapeutic intra-muscular administration to select animals when deemed necessary to minimize anticipated compromised welfare.

Results and Discussion

The principal purpose of dietary SDPP is to support intestinal health, sustain feed intake and reduce the incidence and severity of a post-weaning weight dip during the critical early post-weaning period. Both SDPP and HAT-SDPP clearly reduced the post-weaning dip and improved early technical performances (Table 1 and 2). Trial 2 confirms maximal effects of SDPP during the first week post-weaning (Table 2). It is noteworthy that a post-plasma dip was not observed. In Trial 1, the overall gain to feed ratio (GFR) was even 11% higher in the SDPP piglets ($p > 0.05$).

Even though weaning occurred in present trials without prophylactic use of antibiotics, infectious post-weaning diarrhea was not observed. Mortality was not preceded by clinical intestinal symptoms and was high in trial 1: survival rates were 85% in the control and 91% in the SDPP group ($p > 0.05$, Table 1). In addition, ten control piglets (12%) and twelve SDPP piglets (15%) were given antibiotics to treat ear wounds, suspected streptococcus infections or stunted growth. Mortality and medicine use were low in trial 2: at the end of the pre-starter phase, two SDPP piglets were removed from the trial for welfare reasons² and one SDPP piglet died during the grower phase; one control and three SDPP piglets were treated with antibiotics.

¹ In HAT pasteurized SDPP, a heat-alkalinity-time (HAT) treatment of 48°C at pH 10.2 is applied for 10 minutes to the liquid plasma prior to spray drying.

²Relative weight gain during the pre-starter phase was 24% for both piglets that were removed from the trial.

Table 1. Effects of iso-nitrogenous, partial replacement of soybean meal with spray-dried porcine plasma (SDPP, Actipro® 85 PPS) at a dose of 3% SDPP during a two-week pre-starter phase on piglet post-weaning performance in absence of prophylactic use of antibiotics (Trial 1; N = 8 pens of 10 piglets each).

			SDPP	Control	SEM	Δ (%)
	LW _{d0}	(kg)	5.1	5.1	0.2	-0.3
2 wk pre-starter phase	Weight dip	(% _{pigs})	3.8	7.5	2.2	-50.0
	SR _{d0-13} *	(% _{pigs})	97.5	92.5	2.7	+5.4
	SLW _{d13}	(kg)	6.1	6.1	0.1	1.4
	NLW _{d13}	(kg)	6.0	5.6	0.2	+6.2
	ADFI	(g/d)	191^a	150^b	6	+27.1
	ADG	(g/d)	70	45	14	+55.3
	GFR	(kg/kg)	0.37	0.27	0.09	+35.2
6 wk weaning period	SR _{d0-43}	(% _{pigs})	91.3	85.0	4.0	+7.4
	SLW _{d43}	(kg)	13.4	13.8	0.4	-2.8
	NLW _{d43}	(kg)	12.2	11.7	0.6	+4.4
	ADFI	(g/d)	357	375	13	-4.6
	ADG	(g/d)	180	169	13	+6.4
	GFR	(g/d)	0.50	0.45	0.03	+11.2

^{a,b}different superscripts within a row indicate a significant difference at $p < 0,001$.

*One additional control piglet died at day 1 and was excluded from all data.

LW, live weight; SR, survival rate; SLW, survivor LW; NLW, net LW (SLW x SR x 0,01); ADFI, average daily feed intake; ADG, average daily gain; GFR, gain to feed ratio

Table 2. Effects of iso-nitrogenous, partial replacement of soybean meal with HAT-SDPP¹, (Actipro® 75 PPSP) at a 2-week pre-starter dose of 4% SDPP and subsequent 2-week starter dose of 2% SDPP on piglet post-weaning performance in absence of prophylactic use of antibiotics (Trial 2; N = 6 pens of 10 piglets each).

			SDPP	Control	SEM	Δ (%)
	LW _{d0}	(kg)	5.4	5.4	0.2	-0.3
	LW _{d41}	(kg)	19.5	19.4	0.4	+0.6
Wk 1	Weight dip wk1	(% _{pigs})	5.0^a	16.7^b	2.9	-70.0
	RWG wk1	(%)	10.9^a	6.3^b	1.1	+72.5
	ADG	(g/d)	83^a	49^b	9	+70.0
	ADFI	(g/d)	171^a	130^b	9	+31.5
	GFR	(kg/kg)	0.48	0.36	0.04	+31.3
Wk 1+2	Weight dip wk1+2	(% _{pigs})	1.7	3.3	1.3	-50.0
	RWG wk1+2	(%)	32.0	25.8	2.0	+24.0
	ADG	(g/d)	122	100	10	+22.0
	ADFI	(g/d)	225^a	180^b	12	+25.2
	GFR	(kg/kg)	0.54	0.55	0.02	-1.4
Wk 3+4	ADG	(g/d)	296	291	7	+1.7
	ADFI	(g/d)	477	469	13	+1.7
	GFR	(kg/d)	0.62	0.62	0.01	+0.1

^{a,b}different superscripts within a row indicate a significant difference at $p < 0,001$.

RWG, relative weight gain, other abbreviations see Table 1

References

- Campbell JM, Polo J, Russell LE, Crenshaw JD. 2010. Livest Sci 133, 239–241.
 Torrallardona D. 2010. Asian-Aust J Anim Sci 23, 131-148.
 Van Dijk AJ, Everts H, Nabuurs MJA, Margry RJCF, Beynen AC. 2001. Livest Prod Sci 68, 263-274.