SURVIVAL OF PIGS CHALLENGED WITH F-18 *ESCHERICHIA COLI* WAS IMPROVED WHEN FED DIETS CONTAINING ULTRAVIOLET LIGHT TREATED SPRAY DRIED PORCINE PLASMA

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INTRODUCTION

The Iowa State University Veterinary Diagnostic Laboratory (ISUVDL) reported a major increase in ETEC diagnosed sample submissions in 2021. Recent conferences have devoted special sessions to discuss experiences about the recent emergence of ETEC related outbreaks at US swine farms. Many of the cases report that F-18 *Escherichia coli* is the primary strain associated with these outbreaks and that mortality can be up to 20-30% in nursery pigs. Traditional medication protocols appear to be less effective in controlling these outbreaks and this may be related to recent reports that current strains of ETEC have developed more resistance to medications approved for use in swine. Previous publications have reported that spray dried plasma in feed or drinking water for weaned pigs challenged with various strains of ETEC reduced mortality and diarrhea and improved growth rate.

Therefore, the objectives of the current study were to determine if dietary ultraviolet light treated spray dried porcine plasma (UV-SDPP) improved survival and growth of weaned pigs challenged with an isolated strain of F-18 ETEC.

MATERIALS & METHODS

The study was conducted at a BL-2 research facility under certified veterinary supervision care. Protocol specifications required that study pigs were negative for PRRSV, PEDV, and *Mycoplasma hyopneumoniae*, that the genetic source of pigs (PIC 800 boar x 1050 sow) were sensitive to F-18 ETEC, and that no medical interventions including electrolytes were to be used. Male pigs were 21 d of age at weaning and were transported to the facility, weighed, sampled, and provided their assigned diet at arrival. The antimicrobial free diets (Table 1) were based on corn, soybean meal, whey and either 4.12% soy protein isolate (SPI) or 5% UV-SDPP. The different diets were fed to pigs housed in separate rooms for the entire 21-day study. There were 6 pens (5 pigs/pen; 30 pigs) assigned the SPI diet and 7 pens (5 pigs/pen; 35 pigs) assigned the UV-SDPP diet. All pigs were challenged with F-18 ETEC on day 7 and individual pig fecal swabs were collected day 2, 6, 9 and 14 post-challenge. Fecal swabs were sent to the nearby ISUVDL to be plated and incubated using a semi-quantification method to measure F-18 shedding using a 5-point scale (0 to 4) where 0 = no growth and 4 = heavy growth.

TABLE 1. COMPOSITION OF DIETS*

Ingredient, %	SPI	UV-SDPP
Corn	54.52	54.83
Soybean meal (47% CP)	20.77	20.77
Deproteinized whey	13.16	13.16
Spray dried porcine plasma (UV-SDPP)	---	**5.00**
Soy protein isolate	**4.12**	---
Soy oil	3.46	2.77
L-lysine HCL	0.54	0.38
DL-methionine	0.17	0.15
L-threonine	0.20	0.09
L-tryptophan	0.04	0.01
Calcium carbonate	0.91	1.01
Dicalcium phosphate (18.5% P)	1.26	1.08
Salt	0.22	0.10
Vitamin premix	0.25	0.25
Trace mineral premix	0.15	0.15
Mold inhibitor	0.25	0.25

*Formulated to contain 19% crude protein, 1.53% lysine and 3404 kcal/kg ME

Figure 1: Survival of Pigs by Diet and Day of Study

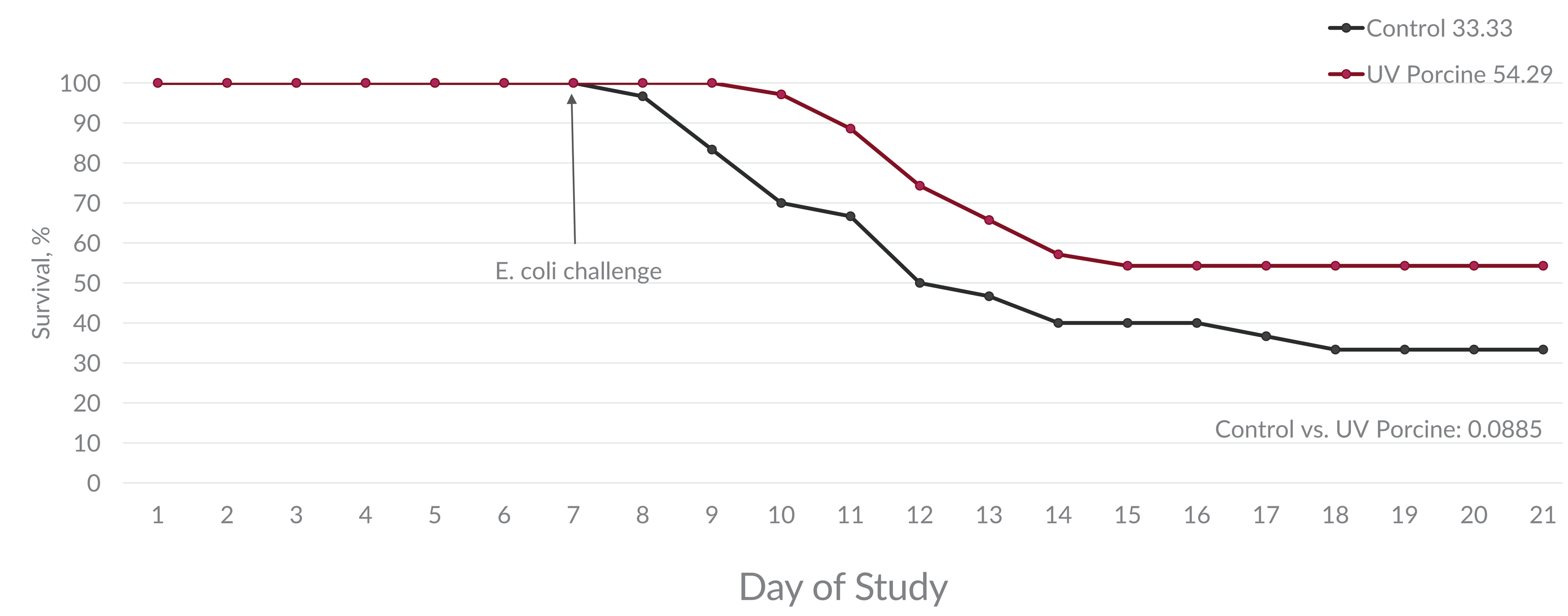


Figure 2: Average Body Weight by Diet and Day of Study

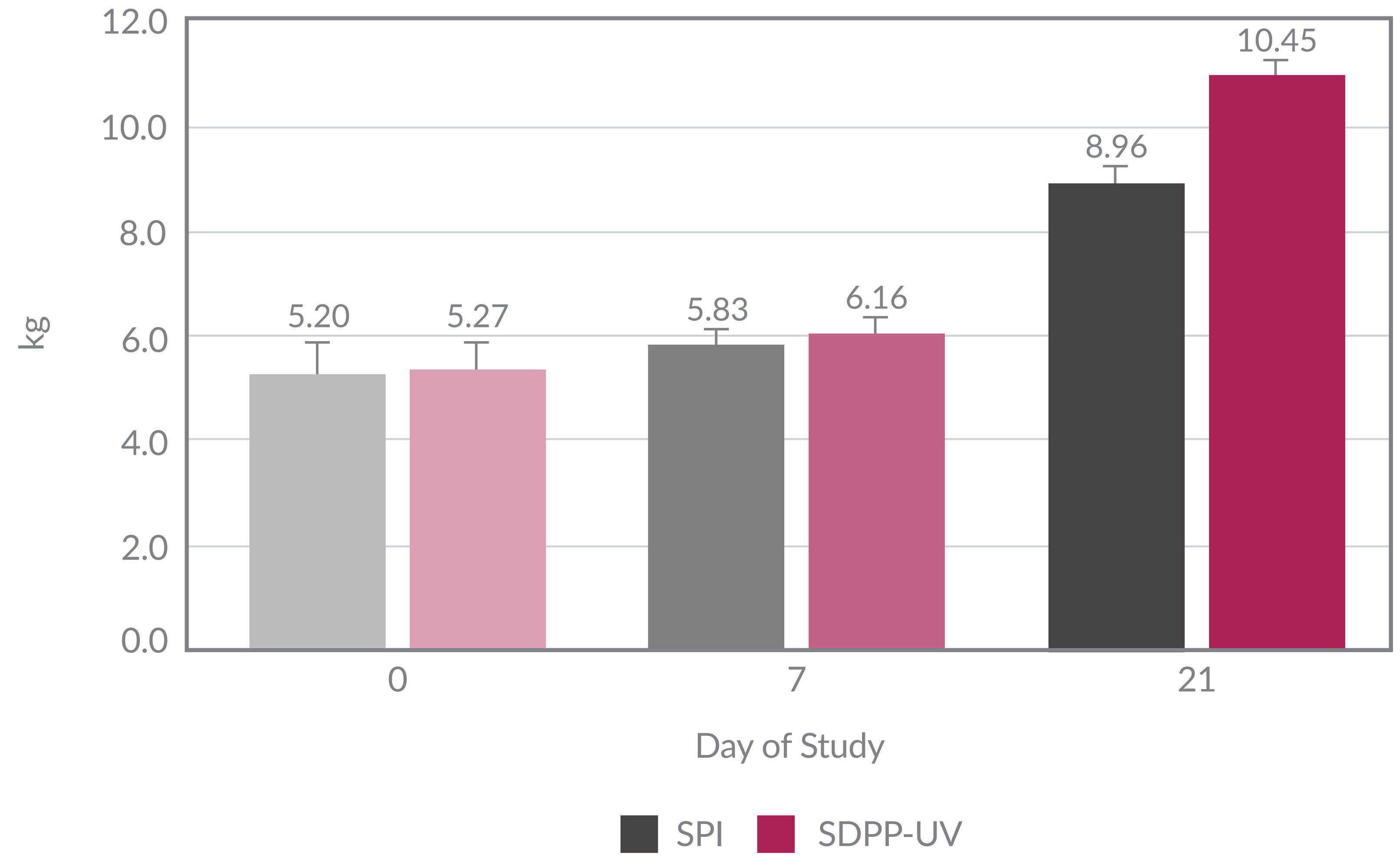
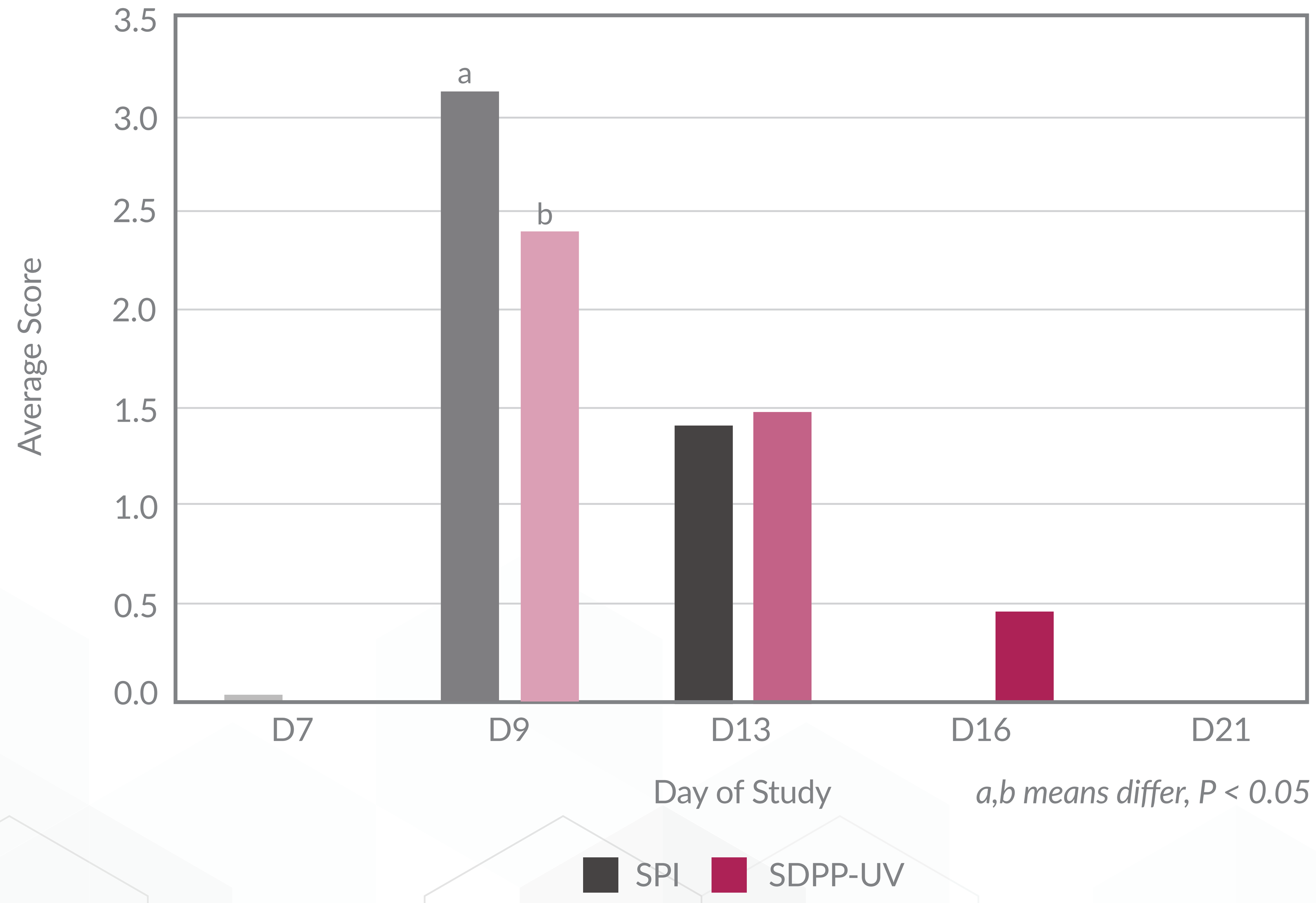


Figure 3: Fecal F-18 Shedding Composite Score by Diet and Day of Study



RESULTS

Survival (Figure 1) was improved 63% (*P = 0.0885*) for pigs fed diets with UV-SDPP (54.3%) versus SPI (33.3%) and surviving pigs fed UV-SDPP were about 1.5 kg heavier than surviving pigs fed SPI at d 21 (Figure 2). In Figure 3 the fecal shedding quantified score for F-18 ETEC was reduced (*P < 0.05*) for pigs fed UV-SDPP (2.314) versus SPI (3.172) on day 2 post-challenge.

CONCLUSIONS

Under these experimental challenge conditions with no medical interventions allowed, pigs fed the UV-SDPP diet were more resilient to F-18 ETEC challenge suggesting that dietary UV-SDPP can be used as part of a health management protocol to reduce the severity of F-18 related ETEC outbreaks.

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