

CLINICAL EVALUATION OF AN ORAL GLUCOSE-GLYCINE ELECTROLYTE FORMULATION IN PREVENTION AND THERAPY OF
WEANING DIARRHEA IN PIGS

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INTRODUCTION:

Glucose-glycine electrolyte formulations (GGEF) for oral rehydration are based on the observation that glucose and glycine are readily absorbed by the small intestine accompanied by the absorption of sodium and water. Bywater (1980) and Bywater and Woode (1980) reported favorable results with a GGEF for oral therapy of diarrhea in neonatal pigs. Mortality was reduced and weight gain was improved significantly. In older pigs, Wilcock and Olander (1978) found no positive effect of oral electrolyte therapy in enteritis due to Salmonella infection.

The purpose of these experiments was to clinically evaluate the palatability of GGEF in pigs and to evaluate its effect on health and growth performance of normal and diarrheic recently weaned pigs. The experiments were also designed to test the practical applicability of using a GGEF for prevention and treatment of diarrhea under field conditions.

MATERIAL AND METHODS:

Six different experiments involving 617 recently weaned crossbred pigs were conducted under three different herd-environmental conditions. In Experiments 1 and 2, pigs were weaned at 25-35 days of age. In Exp. 3-6, pigs were weaned at 16-21 days of age. Various combinations of medicated feed and water were compared (see Table 1). Exp. 1 and 2 were conducted under herd conditions where the pigs were experiencing only a low incidence of a mild weaning diarrhea. Exp. 3-6 were conducted in a herd with a moderate incidence of weaning diarrhea. Exp. 1-4 were conducted with ad lib access to GGEF water over a 14-day treatment period. Exp. 5 and 6 were conducted to evaluate GGEF as a short-term therapy at clinical manifestation of diarrhea (especially Exp. 6).

Feed and Medication: Feed on all occasions was a 19% crude protein starter feed. Non-medicated feed served as control feed. Medicated feed was aureomycin-sulfamethazine-penicillin (ASP-250^R, American Cyanamid, Wayne, NJ) at 250 ppm (Exp. 1-2), and carbadox (Mecadox^R, Pfizer, Inc., New York, NY) at 150 ppm (Exp. 3-6).

Glucose-Glycine Electrolyte Formulation (GGEF):

The GGEF was a commercial product (Resorb^R, Beecham Laboratories, Bristol, Tenn.) used and approved for rehydration of calves with enteritis. Composition of the product was:

Ingredient	Grams/Liter	Percent
Sodium chloride	4.09	14.3
Glucose	19.26	67.6
Glycine	2.94	10.3
Citric acid	0.23	0.8
Potassium citrate	2.06	0.2
Potassium dihydrogen phosphate	1.94	6.8

The product was used as commercially available. Contents of one unit were added to 1 litre of drinking water. In Exp. 1-4, the contents of both packages were added to 1 litre of water. As a part of Exp. 5-6, the glucose was removed to determine the influence of the glucose on palatability, diarrhea and mortality.

RESULTS:

Means were calculated for groups receiving similar treatments at similar ages at weaning. Pigs weaned at 16-21 days of age showed a significant ($P < .001$) increase in water consumption when GGEF was compared to plain water (see Table 2). Removal of the glucose from the electrolyte formulation decreased the water intake to be similar to the plain water groups. ADG of pigs receiving GGEF was 188 g/day versus 168 g/day for plain water ($P < .13$). Pigs weaned at 16-21 days of age and receiving medicated feed demonstrated an increase in ADG ($P < .05$) compared to pigs receiving non-medicated feed. No significant differences were detected when group means were compared for pigs weaned at 25-35 days of age.

Several factors appeared to influence the results on growth and health in pigs receiving GGEF, including age of weaning and the length of exposure to GGEF. Response was greater in pigs weaned at 16-21 days of age. Long-time ad lib exposure to GGEF was associated with negative effects such as over-consumption of GGEF water and maintaining of a loose stool.

Table 1. Design of trial.

Treatment (N)	Control (N)	# Replicates		Weaning age days
		Treatm.	Contr.	
MW+PF (41)	PW+PF (41)	4	4	25-35
MW+MF/PF (55)	PW+MF/PF (82)	5	8	"
MW/PW+MF (55)	MW/PW+PF (82)	5	9	"
"- (180)	"- (260)	9	13	16-21
MW+MF/PF (100)	PW+MF/PF (100)	5	5	"

MW = Medicated water (GGEF); PW = Plain water;
MF = Medicated feed; PF = Plain feed
(N) = # pigs

Table 2. Standard deviations of means of comparisons between treatments.

	Fluid Consumption (1/day)		ADG (g/pig/day)	
	Mean and Std Dev.		Mean and Std Dev.	
	Treatm.	Control	Treatm.	Control
MW+PF	1.89 \pm .63	1.48 \pm .44	187.5 \pm 33.9	168.0 \pm 42.8
MW+MF/PF	1.83 \pm .56	1.44 \pm .33	213.2 \pm 64.5	188.0 \pm 56.6
MW/PW+MF	1.45 \pm .22	1.68 \pm .55	229.4 \pm 76.1	177.9 \pm 37.2
"-	0.90 \pm .27	1.01 \pm .30	74.6 \pm 56.9	29.9 \pm 34.6
MW+MF/PF	1.24 \pm .17	0.72 \pm .12	50.4 \pm 44.8	15.8 \pm 17.4

CONCLUSIONS:

The electrolyte formulation (GGEF) was very palatable to pigs, probably due to the high glucose content of the product. Tendencies for increased water consumption and ADG in medicated water treated groups suggest areas for further investigations. Short-term administration of the product (2-3 days in drinking water at signs of diarrhea) would most likely be expected to produce beneficial effects in early weaned piglets as long-term ad lib exposure to GGEF tends to cause an over-consumption of the formulation

REFERENCES:

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