USE OF A GLUCOSE-GLYCINE-ELECTROLYTE SOLUTION TO STIMULATE WATER INTAKE AND ABSORPTION AFTER EARLY WEANING

R.J. BYWATER
BEECHAM PHARMACEUTICALS RESEARCH DIVISION, ANIMAL HEALTH RESEARCH CENTRE,
WALTON OAKS, DORKING ROAD, TADWORTH, SURREY, ENGLAND.

Oral rehydration using a glucose-glycine-electrolyte solution ⊕ (GGES) has been shown to be effective in treatment of dehydration following diarrhoea associated with either E. coli or rotavirus infection (Bywater & Woode, 1980). It is also of value in TGE (Marriott et al, 1981).

The principle of oral rehydration depends on linked intestinal uptake of actively absorbed glucose and amino acid with water and sodium, to offset losses caused by the diarrhoea (Bywater 1977).

Weaning at 3 weeks of age or earlier is becoming common. This practice is sometimes associated with inadequate intake of water, which can impair performance during the period following weaning. In some cases actual dehydration may result.

The present experiments were carried out to determine whether access to GGES for a limited period after early weaning would improve survival or performance in piglets weaned at around 3 weeks of age.

Experiment 1

Piglets were weaned at 3-4 weeks in batches of 60, and housed in a veranda system. Liquid was provided in graduated plastic containers fitted with nipple drinkers. Alternate batches received either water throughout or isotonic GGES given ad lib for 3 days. Piglets were weighed on day 4 and day 18 after weaning, and any health problems noted. A total of 209 pigs received GGES with 208 given water (controls).

The results (mortality and weight gain) in Experiment 1 are shown in Table 1., and the volumes consumed in Table 2.

	Control	GGES
Number of pigs	208	209
Mean weight at weaning (kg ± SD)	6.72±1.85	5.72±1.75
Mortality	4(1.83%)	1(0.48%)
Mean weight gain (7days)	15.4%	20.6%
Mean weight gain(18days)	81.3%	87.9%

Table 1. Mortality and weight gain in piglets after weaning given either water (control) or GGES for 3 days.

	Days after weaning 1	2	3	4	5	6
Control(lt/pig/day)	0.49	1.33	1.23	1.33	2.03	1.68
GGES (lt/pig/day)	0.63	1.40	1.54	1.19	1.89	1.79
	GGES available					

Table 2. Mean volume of GGES or water consumed (lt/pig/day)

⊕ Lectade (European countries), Biodiet (France) Re-sorb (USA)

This experiment suggested that use of GGES at an isotonic concentration gave an apparent improvement in weight gain over 7 days which was still present at 18 days. The mortality appeared to be also reduced, but the difference was not significant. The volumes of GGES consumed were greater than the volumes of water, and work elsewhere suggested that ad lib consumption of isotonic GGES could become excessive. A second experiment was therefore carried out using 50% of the concentration, to determine if a benefit was demonstrable.

Experiment 2

Using a different regime, 166 piglets weaned at 2-3 weeks were placed in groups of 10 in flat deck cages housed in environmentally controlled cubicles, ('Pigiboxes', Remark Ltd., Lincoln, UK). The water supply was from header tanks placed above the cages. Pigs were given either water as normal (controls) or a 50% isotonic solution of GGES. The latter was available for 6 days after weaning. The weight gain, volumes consumed (over first 6 days) and health status were monitored. The results are shown in Table 3.

	Control	GGES(50%)
Number	83	83
Mortality	0	0
Mean weight at weaning(kg)	3.83	3.41
Mean weight gain (7days)	-4.4%[a]	+5.1%[a]
Mean weight gain (6weeks)	+199%	+236%
Fluid consumption(lt/pig/day)	0.62	0.84[b]

Table 3. Weight gain and fluid consumption in piglets after early weaning given either water or 50% GGES. ([a] P<0.001 versus starting weight. [b] P<0.001 versus control)

Conclusion

The use of GGES as a supplement after early weaning of piglets appeared to encourage fluid intake and to give improved weight gain especially during the immediate post-weaning period. The results suggest that some benefit may persist beyond this time. In practice, ad lib access to isotonic GGES over periods of greater than 3 days may lead to over-drinking due to the high palatability, which seems to increase with amount taken and duration of access.

The experiment above showed the solution diluted by 50% still retained the ability to improve weight gain in the post weaning period. This concentration is less likely to lead to over-drinking, and so is preferable for the purpose.

Selected references

Bywater, R.J. (1977) Am J Vet Res 38, 1983.

Bywater, R.J. & Woode, G.N. (1980) Vet Rec 106,75-78

Marriott, D.W., Wilkinson, J.D. & Bywater, R.J. (1981) Vet Rec 108, 264