USING CREEP FEEDING TO IMPROVE PIGLET'S HEALTH DURING NURSING PERIOD

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ABSTRACT

Antibiotic resistance was hot issue in animal, humans and environment . Good creep feeding can be a potential antibiotic replacement which has been emphasized due to ability to improve piglet's health. The study were processed at a commercial farrowing to nursery farm, Binh Dinh province. Piglets from litters were divided into 2 groups: conventional group, and creep feeding group with 2 products from Belgium used in 2 consecutive periods time (1-7days of age and 7-21 days of age). Weight gain and diarrhea rate were recorded and compare to 2 groups. The result of experiment show that there was no significant difference between 2 groups about weight gain. However, the diarrhea rate of the creep feeding group was much lower than the one of conventional group significantly. This would be a great initiation for piglets with these creep feeding products to grow in the next steps.

Keyword: *weight gain; diarrhea; probiotic; prebiotic; essential oil; organic acid; suckling pig.*

INTRODUCTION

As we know that suckling pigs are very sensitive because of immature digestive system in which the enzymes and hydrochloric acid (HCl) concentration might be very low and villi structure might not be functional well (Hampson and Kidder, 1986; Boudry et al., 2004). It leads to many digestive disorders. The inappropriate use of antibiotics in treatment as well as animal feeds lead to antibiotic residue in animal products that may contribute to an antibiotic resistance in animals and humans

Therefore, improvement of productivity in animal husbandry is a question for pig producers in which can help to decrease diarrhea rate during suckling pig period. To minimize this, creep feeding is mentioned much today. They are a combination of antibiotic alternatives like probiotics, pre-biotic, essential oil and so on. Creep feeding initiates and promotes gut and digestive enzyme development, which enables the piglet to digest nutrients from colostrum, sow milk, additional milk or feed. This encourages feed intake, which is one of the greatest challenges to post-weaning performance (Bruininx et al., 2002).

In Vietnam, many pig producers have still not understood well the effect of this program. For that reason, it was performed to evaluate a specific creep feeding program during the period from 1-21 days old by carried out this study : "Using creep feeding to improve piglet's health during nursing period".

MATERIALS AND METHODS

- **Time and location of study**

The study was carried out from 22/9/2018 to 15/11/2018 at a commerical farrow-to-nursery pig farm, Cat Lam commune, Phu Cat ward, Binh Dinh province. Moreover, culturing and isolating some specific bacteria from 2 creep feeding products were performed at microbilogogy lab, Faculty of Animal Science and Veterinary Medicine, Nong Lam University

- **Study's contents**

Study's purpose was to evaluate the efficacy of creep feeding for nursing piglets from birth to 21 days old (before weaning). The efficacy can be assessed by comparing the piglets' diarrhea rate and weight during the study in the creep feeding group to those in the control group. In addition, to understand the products used for creep feeding, some microbiological parameters will be carried out.

- **Products used for creed feeding**

The creep feeding program in this study includes 2 products from a company in Belgium (Table 1). Experiment design was explained in Table 2.

Table 1. Characteristics of two feed types use in experiments

Type	Product x 9132	Hydro pre-start 9253
Period	Birth till 1 weeks old	After Product x, until 21 days old
Composition	Algae, Iron, butyrate, different clay minerals, yeast, calcium lactate, formate, bacillus coagulants (kill) and fermented protein.	Mineral, foric acid, ferulic acid, humic acid, non-digestible carbonhydrate, antioxidants, beta-glucan.
Reference dose	Day 1: 3mg/30ml water/day/piglet Day2: 4mg/40ml water/day/piglet Similarly, increase 1mg /1day/piglet, calculate day 3, day 4, day 5, day 6, day 7.	Day 8: 50mg/1pen Free feeding base on uptake of each pen (9-21 days old)

Table 2. Trial design in farm

Design	Experiment 1	Experiment 2
Number of pens	15 control pens (216 piglets) 15 treatment pens (237 piglets)	7 control pens (94 piglets) 7 treatment pens (104 piglets)
Feed	Product x: 1-7 days old, continuously, increase feed mass follow the age	Product x: 1-7 days old Hydro pre-start: 8-21 days old
Dose	Base on reference dose (table 1)	

Note: Control pen (experiment 2): 1-7 days old: No creep feeding; >7 days old: Current feed of farm

- **Parameters**
    - ***Microbiological analysis***

In order to know the bacteriological content of these products, samples of 500 gram of each product were collected and sent to the microbiological lab of Nong Lam university for analysis. Parameters will be determined including: total lactic acid bacteria (LAB), total number of bacilli, and total number of yeast in the products. Media used for isolation include MRSA (De Man, Rogosa, Sharpe Agar), Trypticase Soy Agar (TSA), Sabouraud Agar (SA) as the standard methods of the lab.

    - ***Field measurement***

During the study, these parameters will be collected as conventional protocol of the farms such as body weight of piglets at 1 day old, 7 days old and 21 days old, number of diarrhea cases, time length of each case, number of other disease piglets, number of dead cases. Then the diarrhea rate, diarrhea-day rate and mortality was calculated.

- **Data analysis**

Data analysis was done by using a descriptive analysis in Microsoft Office Excel, the results are summarized and reported as mean, range and standard deviation which performed into tables and charts. One-way analysis of variance (ANOVA) was performed to analyze the mean age between different age groups and p-value < 0.05 was considered significant.

RESULT and DISCUSSION

- **Microbiological result**

Two samples were cultured in 3 different agars, count and calculate colonies as CFU/g which could see clearly in Table 3.

Table 3. Result of culture 2 feed samples in lab

	LAB(CFU/g)	Bacillus (CFU/g)	Yeast (CFU/g)
Product x	Not detected	8.29×10^6	1.27×10^8
Hydro pre-start	4.80×10^5	4.15×10^6	1.10×10^7

Product x contained bacillus and yeast while Hydro pre-start had more one bacteria is LAB. The amount of *bacillus* and y*east* in two products are similar are Gram-positive, spores-forming microorganisms, commonly associated with soil, water and air, and present in the intestinal tract due to involuntary ingestion of contaminated feed. Though some of the *Bacillus* species are used as a probiotic. *Bacillus* are inactive spores that are the stable and survive at a low pH and, therefore, are thought to survive feed processing and digestion in the stomach. The pH in the small intestine is 6 to 7, which is optimal for the spores to germinate, grow, and produce enzymes (Gaggìa et al.)

Many studies showed that *yeast* or *yeast*-based product supplementation may boost pig growth performance, augment mucosal immunity, promote intestinal development, adsorb mycotoxins, reduce post-weaning diarrhea, and modulate gut microbiota (Shen et al.).

LAB is the most common probiotic in animal and humand, expecially, *Lactobacillus is the most common probiotic in animal and human food. LAB have benefic effect in gut health:* important for bacterial colonization, pathogen exclusion, and interaction with host cells for the protection of epithelial cells or immune modulation, lactic acid produced by LAB contributes to an acidic environment in the GIT which partly influences growth of pathogenic microorganisms, lactic acid produced by LAB contributes to an acidic environment in the GIT which partly influences growth of pathogenic microorganisms (Yang et al.).

The result can be understand that LAB might have a better effect after 7 days. The first phages might be better for increase the developing of their villi and enough nutrient for their demand. Hydro pre-start product use some different organic acid to Product x feed is humic acid and ferulic acid. Two components help detoxification and antioxidant. Moreover, hydro pre-start contain a kind of non-digestive carbohydrate known as prebiotic (Lamber-Seghers company report).

On the other hands, two kinds of feed contain other antibiotic replacement composes: organic acid, essential oil, antioxidants, mineral, and many necessary nutrient components (Lambers-Seghers company).

- **Use of** Product x **feed during 1-7 days old period**

There were 2 groups which treatment group had total number of piglets was 237 and control group had 226 piglets. Weight per pen of per group is difference, however, over chi-square test, mean of two group had significant statistics (p>0.05) at day 1. These results showed that mean of two groups were not significant difference after experiment group use power feed (p>0,05). In period 1, the result showed that there was not difference growth and productivity between 2 groups (Table 4).

Table 4. Summarize table of two groups at Day 1 and Day 7 (experiment 1)

	Day 1		Day 7	
	Control	Treatment	Control	Treatment
Litter size	14.9/sow	15.8/sow	12.9/sow	15.13/sow
Number of piglets	216	237	194	227
Mean (weight)	1.095	1.111	1.920	1.995
Standarddeviation (SD)	0.100	0.091	0.217	0.268
P- value	**0.899**		**0.440**	

On the other hand, diarrhea rate were significant difference between two group with chi-square test p<0,001 (Yate's correction). So, the diarrhea rate of experiment group reduce clearly (Table 5).

Table 5. The diarrhea occurrences during the first 7 days

	Control	Treatment
Number of piglets	216	237
Number of diarrhea piglet	20	3
Prevalence	9.26%	1.27%
p- value	**<0.001**	

Diarrhea rate of treatment group reduce to no treatment group mean piglet use Product x feed had diarrhea rate less then no use feed was about 8%. This study show that mix fluid feed use in 1-7 days old period also helped in improve diarrhea rate.

- **Use of** Product x **feed during 1-7 days old and hydro-prestart during 8-21 days old**

Table 6. The table of two groups from Day 1 to Day 21 (Experiment 2)

	Day 1		Day 21	
	Control	Treatment	Control	Treatment
Number of litter	13.43/sow	14.86/sow	13.43/sow	14.57/sow
Number of piglets	94	104	94	102
Mean (weight)	1.038	1.100	4.983	5.221
SD	0.028	0.121	0.719	0.536
P- value	**0.077**		**0.494**	

The number was analyzed by chi-square test between treatment group and no treatment group at day 21 with p=0,494>0,05. So, the numbers wasn't significant difference at day 21. That means weigh of two groups after 21 days old was similar and cannot prove anything about the weigh improvement (Table 6)

Table 7. The diarrhea status from Day 1 to Day 21 (Experiment 2)

	Control	Treatment
Number of piglets	94	104
Number of diarrhea piglet	16	1
Prevalence	17.02%	0.96%
P- value	**<0.001**	

Diarrhea rate had positive result (p<0,05) and treatment group had diarrhea rate very low. The suckling pigs used feed of company was higher diarrhea rate than Product x feed 16%. This was high significant number. Diarrhea rate of two groups after treat both two feed kinds have significant mean when see chi-square test because of p<0,05 (Table7)

Ta Thi Vinh et al. (2002) use VITOM1.1 preparation for sucking piglets, weight gain rate of treatment group is 6% compare to no treatment group. Hadani et al (2002) showed that weight gain rate increased 5,5% when use Probactrix preparation (probiotic). Compare of using Product x and hydro pre-start feed was as not effective as before studies.

Tran Thi Thu Thuy (2003), the results of the study on the use of probiotic (Organic Green) in the prevention and treatment of diarrhea in piglets under the mother stage and the pre-weaning period, showed the rate of diarrhea sucking piglets decreased by 1.5 - 3%; 1.5 - 5.7% reduction in pre-weaned piglets.

Pham Khac Hieu et al (2002), study of EM 1 **(**Effective microorganisms 1) preparations showed that EM1 preparations have inhibitory effects on *E.coli, Salmonella, Klebsiella, Shigella, Proteus, Staphylococcus, Streptococcus, Clostridium perfringens*, *Lutea Sarcina*. Result showed a 7% diarrhea reduction in pigs 1-21 days old. Compare of using Product x feed was higher than study of Tran Thi Thuy (2003) and Pham Khac Viet (2002). This can because husbandry environment and weather condition difference. Product x feed components have more complexly and completely.

Table 4.6 Mortality rate and diarrhea-day rate

	Control group	Treatment group
Diarrhea-day rate	3.92%	0.06%
Mortality rate	4.25%	3.85%
P-value	**0.89**	

Diarrhea-day rate of control group was 3.92% and the top was 21.78%. Diarrhea-day rate of treatment group was significantly lower and the top was 0.43%. It proved that control group had high diarrhea rate and high diarrhea time prolong in many cases and maybe lead to dead. Mortality rate of two group was no significant different with p-value> 0.05. However, mortality rate contain diarrhea cases, other disease cases and weigh dead because of sow.

CONCLUSIONS

Use of Product x and hydro pre-start feed in 1-21 days old did not improve weight gain clearly. However, diarrhea rate in the group with creep feeding had considerably improved from Day 1 to Day 21. Lab analysis proved that this product contain LAB, *Bacillus* and yeast which are considered as good preparation for piglets at the early time of their lives. The significant reduction in diarrhea rate of creep feeding group led to drop mobility and mortality, raise absorption antibody in milk and improve immunity system. Then these can be considered as a kind of antibiotic alternatives that should be informed for farmers. The future research might assess these pigs in the next periods with more number of pigs observed to be able calculate the full benefit from this feeding program.

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