

## **THE INFLUENCE OF DIFFERENT WEANING METHODS ON PIGLET GROWTH PERFORMANCE IN COMMERCIAL HERD IN TURKEY**

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### **Abstract**

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This study was carried out to determine the effects of different weaning methods on survival, growth performance and live weight gain of piglets from 84 piglets divided into three groups as control and two treatment group. In the control, piglets were suckled on mother; treatment group 1 was fed in pelleted form and suckled; treatment group 2 was fed only in pelleted form until weaning age. A significant difference ( $P < 0.05$ ) was observed in survival rates among the groups from the 21<sup>st</sup> day to 35<sup>th</sup> day of age. Average daily weight gain and feed efficiency (except for the first week) of the piglets in the treatment group one were higher ( $P < 0.01$ ) than that of the other groups. The results obtained in the experiment showed that feeding of piglets with pellet and mother milk till the time of weaning age has positive effect on survival rate, growth performance and live weight gain.

*Key words:* feed efficiency, pigs, survival rate, weight gain

### **Introduction**

In private commercial of Turkey, pigs whose strain is mostly crossbred are brought up a limited quantity and generally fed with kitchen wastes. Newborns feed only suckling the mother milk until weaning and their weaning age is about 45-day-old. As pointed out by Akdag (2003), the average live weight and survival rate of weaned piglets were 4.24 kg and 65.76%, respectively. These values are very low compared to the weaning weight (Vesseur et al., 1997 and Milligan et al., 2002) and survival rate (Thomas et al., 1983 and Mota et al., 2002) reported by other research-

ers. It depends on a few factors in breeding conditions. One of them, the environmental factors such as ambient temperature affects nutrient utilization and feeding behaviors in pigs. Another reason, during the growing period, the voluntary feed intake (VFI) is influenced by the type of pig (breed, sex) (Quiniou et al., 2000). Besides them, the type of feeding is also affect on daily weight gain of piglets. Thomas et al. (1983) had indicated that the milk yield of the mother increases gradually during the first three weeks after the birth, reaches a peak value at the end of the 3<sup>rd</sup> week and gradually decreasing at after the 3<sup>rd</sup> weeks. Furthermore, they emphasized that after first 3 weeks

would be better to feed piglets with supplemental diets. In generally, it is widely adopted the pelleting diets will improve average daily gain and feed conversion efficiency in pigs (Van der Poel et al., 1997). However, at weaning, the digestive system of piglets has to adapt to a dry pelleted diet instead of liquid sow's milk. The piglets may often show depressed feed intake and growth (Vente-Spreewenbergh et al., 2004). For this reason, it is imported that segregated-early-weaning may result in growth characteristic advantages, such as improved feed efficiency and growth rate. The aim of the present study was to determine the effects of different weaning methods on survival rate, growth performance and live weight gain in piglets.

## Materials and Methods

This study was carried out on 84 crossbreed piglets obtained from composite breeding of Bulgarian Large White, (Landrace), Large Black and Turopolje breeds, in a commercial swine production farm in Istanbul. Without altering any condition in the management, piglets were kept at different individual farrowing pens with dimensions of 2.0 m x 2.20 m. In each pens, 7 piglets were used for throughout in the study.

In the study, 84 piglets of 12 sows with first parity and with equal litter size were used and data were recorded. The piglets were housed with their mothers and fed only with mother milk until the 18<sup>th</sup> day in individual farrowing boxes. In order to carry out different weaning methods, on 18<sup>th</sup> day, the piglets were divided into three groups such as one control and two treatment groups. Piglets in the first treatment group were fed with mother's milk until the 21<sup>st</sup> day of age and fed with pellet feed in addition to mother's milk following this day until the 42<sup>nd</sup> day of age and then weaned. Piglets in the second treatment group were fed with 50 g of commercial feed together with mother's milk between the 18<sup>th</sup> and 21<sup>st</sup> days of age, in order to allow them to adapt to the feed. Piglets in this group were separated from their mothers on the 21<sup>st</sup> day of age and fed with only pellet until the 42<sup>nd</sup>

day of age. Ingredients of the pellet used for both treatment groups were summarized in Table 1. Piglets in the control group were only suckling with their mother until weaning and weaned on the 42<sup>nd</sup> day of age. The drinking trough was used and fresh water available *ad libitum* to the piglet.

To measure the growth performance of the groups, from the 21<sup>st</sup> day to the 42<sup>nd</sup> day of age, the piglets were weighed weekly using a digital scale. After weekly weighting, each treatment group was fed with a feed amount of 3% of the live weight (Chae et al., 1999).

In the study, Chi-square test was used for the significance control of survival rate between the groups. Ordinal Least Square analysis was performed to statistical comparisons among means of the control and treatment groups and gender (male and female) with respect to growth performance. Kruskal-Wallis test were used for non-normal distributing of live weight gain by investigating factors both gender and groups.

**Table 1**  
**Ingredients of the ration, %**

Ingredients	%
Sunflower meal	26.0
Barley	12.0
Maize	50.0
Whole meal	3.5
Meat-bone meal	5.0
Salt	0.5
Dicalcium phosphate	0.8
Vit - min. Premix <sup>1</sup>	0.4
Lysine	1.3
Methionine	0.5
Crude protein, %	22.2
ME, kcal/kg	3.18

<sup>1</sup> Composition of premix/kg: Vitamin A 10.000.000 IU, vitamin D<sub>3</sub> 1.500.000 IU, vitamin E 400.000 IU, vitamin K<sub>3</sub> 3.000 mg, vitamin B<sub>1</sub> 2.200 mg, vitamin B<sub>2</sub> 4.500 mg, niacin 30.000 mg, vitamin B<sub>6</sub> 3.000 IU, vitamin B<sub>12</sub> 15 mg, folic acid 1.500 mg, biotin 100 mg, vitamin C 12.000 mg, Mn 80.000 mg, Zn 60.000 mg, Fe 30.000 mg, Cu 5.000 mg, I 1.000 mg, Co 200 mg, Se 150 mg

Duncan's Multiple Range Test was used for the importance control of differences among the groups' means (John, 1971).

## Results

Survival rate of the groups are summarized in Table 2. The highest survival rate, 71.4%, belonged to the first group of piglets fed with commercial feed in addition to mother's milk, and the lowest score, 46.4%, was obtained from the second treatment group.

Survival for the 28<sup>th</sup> and the 35<sup>th</sup> days of age, means of control and treatment groups was found to be statistically difference ( $P < 0.05$ ) and found to be insignificant for the 42<sup>nd</sup> day of age. Furthermore, it was determined that survival of male and female piglets was nearly the same ( $P > 0.05$ ).

Mean of the growth performance are summarized in Table 3. Growth performance differences among weekly means of the groups during the period of 21<sup>st</sup>-35<sup>th</sup> days was not statistically important ( $P > 0.05$ ) whereas on the 42<sup>nd</sup> day of age the first treatment group reached a higher live weight average with a

4.530 g live weight gain, than the other groups ( $P < 0.05$ ).

Mean of the average daily gain, feed intake and feed efficiency summarized in Table 4. Feed intake means among the groups were insignificantly different from 21 to 42<sup>th</sup> days ( $P > 0.05$ ). Mean of daily live weight gain in the groups were not statistically different from 21 to 28<sup>th</sup> days ( $P > 0.05$ ), however, live weight gain means of the first treatment group in days from 28 to 42 were higher ( $P < 0.01$ ) than the other groups. Mean of feed efficiency of the second treatment group up 21 to 28 were higher ( $p < 0.05$ ) than the other groups. In contrast, feed efficiency of first treatment group up 28 to 42<sup>nd</sup> days were also higher ( $P < 0.05$ ) than the other groups.

Table 3 is summarized for mean of the growth performance, and feed intake, live weight gain and feed efficiency are summarized in Table 5 by male and female. Growth performance, live weight gain, feed intake and feed efficiency in male and female piglets till the 42<sup>nd</sup> day of age were not statistically different ( $P > 0.01$ ).

## Discussion

In the present study, in which different weaning methods were used, it was seen that piglets fed with commercial feed in addition to mother's milk reached the highest survival rate compared to other groups. Contrarily, survivals of control and treatment groups were found to be lower than the survival determined in different pig breeds by some authors (Holyoake et al., 1995; Vesseur et al., 1997; Leenhouders et al., 1999; Steverink et al., 1999; Roehe and Kalm 2000; Valros et al., 2002 and Lauridsen and Danielsen 2004). This low survival rate was attributed to the housing unit's temperature being under optimal conditions. The optimum temperature of the newborn piglets is approximately 30°C. In addition, temperature throughout the nursery period should be range from 22 to 24 °C (Goodboot et al., 2003). Current temperature of experimental pens in the farm was from 5 to 12°C from birthdates till the 42<sup>nd</sup> day of age. Besides, in the present housing unit conditions, it was

**Table 2**  
Survival rates of the groups, %

Factors investigated	Initial litter	Days					
		28		35		42	
	n	n	%	n	%	n	%
Groups							
Treatment 1	28	20	71.4	20	71.4	20	71.4
Treatment 2	28	27	96.4	14	50.0	13	46.4
Control	28	24	85.7	23	82.1	16	57.1
$\chi^2$ /Score		6,785		6,877		3,624	
S.D.		2		2		2	
P value		0.034		0.032		0.163	
Gender							
Male	40	31	77.5	24	77.4	21	87.5
Female	44	40	90.9	33	82.5	28	84.8
$\chi^2$ /Score		2,280		2,161		1,069	
S.D.		1		1		1	
P value		0.090		0.142		0.301	

**Table 3**  
Least square means and their standard errors of growth performance (g) by the groups ( $\bar{x} \pm S\bar{x}$ )

Factors	n	Initial weight (21 Day)	Days		
			28	35	42
Groups		N.S.	N.S.	N.S.	*
Treatment 1	28	2447.8 $\pm$ 127.2	3098.9 $\pm$ 173.9	3735.4 $\pm$ 216.2	4495.2 $\pm$ 150.7a
Treatment 2	28	2348.3 $\pm$ 128.2	2801.8 $\pm$ 149.3	3289.5 $\pm$ 280.3	3747.2 $\pm$ 198.5b
Control	28	2513.5 $\pm$ 127.2	3046.8 $\pm$ 155.6	3426.4 $\pm$ 197.7	3776.2 $\pm$ 166.4b
Gender		N.S.	N.S.	N.S.	N.S.
Male	40	2394.9 $\pm$ 106.6	2949.3 $\pm$ 139.0	3372.7 $\pm$ 213.8	3975.8 $\pm$ 155.5
Female	44	2478.1 $\pm$ 101.6	3015.7 $\pm$ 121.6	3594.8 $\pm$ 165.4	4036.5 $\pm$ 127.9

a, b : Means within a column in a subgroup with different superscripts differ

\*: P<0.05, N.S.: Non significant

**Table 4**  
Average daily gain, feed intake and feed efficiency for groups<sup>1</sup>

Parameter	Treat- ment 1	Treat- ment 2	Control
n, Litters	28	28	28
Days 21 to 28			
ADFI, g/d	73.76	69.94	75.21
ADG, g/d	58.92	62.80	55.76
Gain: feed, g/g	0.78b	0.92a	0.85b
Days 28 to 35			
ADFI, g/d	94.05	83.72	91.40
ADG, g/d	93.92a	3.88b	45.78b
Gain: feed, g/g	1.01a	-2.19c	0.57b
Days 35 to 42			
ADFI, g/d	113.77	93.95	102.58
ADG, g/d	105.35a	62.52ab	34.10b
Gain: feed, g/g	0.89a	0.59ab	-0.36b

<sup>1</sup> Least squares means

a, b: Means with different superscript in the same row differ (P < 0.05)

deduced that insufficient isolation of the floor and walls, which is important for the maintenance of the housing temperature and sometimes wetting of the litter due to such defects, also had an effect on the low survival rate of piglets.

**Table 5**  
Average daily gain, feed intake and feed efficiency for male and female piglets<sup>1</sup>

Parameter	Male	Female
n, Litters	40	44
Days 21 to 28		
ADFI, g/d	71.84	74.00
ADG, g/d	51.62	65.30
Gain: feed, g/g	0.67	1.01
Days 28 to 35		
ADFI, g/d	88.68	89.65
ADG, g/d	37.26	63.38
Gain: feed, g/g	0.20	0.73
Days 35 to 42		
ADFI, g/d	100.47	108.08
ADG, g/d	68.45	72.42
Gain: feed, g/g	0.40	0.16

<sup>1</sup> Least squares means

a, b: Means with different superscript in the same row differ (P < 0.05)

It was observed that piglets fed with commercial feed in addition to mother's milk reached higher values for growth performance and live weight gain until the 42<sup>nd</sup> ages of piglets, compared to other groups. Although there are no significantly different among

groups for values of the feed intake, values of the feed efficiency, except for first week, feed efficiency in consecutively weeks, values in first treatment group are higher than other groups. While, live weight gain and feed efficiency of the second experimental group at the first week was higher than the other groups, at the rest of the weeks a decrease in these values of this second group fed only with commercial feed was recorded.

It was suggested that this situation may be related to the piglets' adaptation periods during transition from mother's milk to solid feeds. Therefore, a gradual transition from mother's milk to pellet feed was suggested. Otherwise, regression can happen in the initial periods of growth (Vente-Spreuwenberg et al., 2004). In addition, live weight gain (Shon et al., 1994; Nessmith et al., 1997; Angulo and Cubiló 1998; Lauridsen and Danielsen 2004 and Straub et al., 2005) and weaning weights (Mota et al., 2002; Bruininx et al., 2001; Bates et al., 2003 and Straub et al., 2005) of all groups were lower, compared to weaning weights determined in different breeds of pigs by some authors. This discrepancy has been attributed to insufficient conversion of feed to the yield by the piglets because of low temperature of the housing unit and the breed (Quiniou et al., 2000) of the piglets used in the study; this is also attributed to the use of kitchen wastes in feeding breeder pigs, which may prevent piglets from sufficiently covering their nutritional demands from the mother's milk (Thomas et al., 1983).

## Conclusions

In conclusion, it has been determined that feeding of piglets with supplementary feed until weaning has a positive effect on survival, growth performance and live weight gain of the piglets.

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