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RESEARCH ARTICLE

Litter Parameters after Newborn Piglets Peroral Treatment with "Hokovit" Immunomodulator Preparations [1]

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Summary

Litter parameters (piglets mortality, weaned piglets per litter, piglet daily gain and body weight at weaning), after peroral treatment of newborn piglets with natural immunomodulator preparations, were investigated at one commercial pig farm in Serbia. Each piglet in 30 litters were peroral treated with 2.5 mL of One Shot immunomodulator preparation within 2 h to 6 h after farrowing, and 1.2 mL Coloron Forte Plus immunomodulator preparation 24 h after One Shot treatment. Starting at day 7 after farrowing up to weaning, piglets were fed the diet for suckling piglets, supplemented with Piggy Guard Forte Plus immunomodulator preparation (15 kg of preparation/t of diet). In the control group (n=30), piglets were not treated with probiotics. Piglets mortality were significantly (P<0.05) lower in the probiotics treated group than in the untreated (control) group (av. 0.27 vs. 0.53 dead piglets per litter, resp.). Average number of weaned piglets per litter was significantly (P<0.05) higher in the treated group (9.16), compared with the control group (8.97). Piglet body weight (av. 8.60 kg vs. 7.53 kg) and daily gain (av. 228 g vs. 193.8 g) from farrowing to weaning, were significantly (P<0.01) higher in the treated group. The results showed that newborn piglets treatment with immunomodulator preparations can decrease piglets mortality rate and increase their growth performance during suckling period.

Keywords: *Immunomodulators, Mortality, Growth performance, Preweaning period, Newborn piglets*

Yeni Doğan Domuz Yavrularında Oral 'Hokovit' Immunomodulatör Uygulamasının, Sütten Kesim Öncesi Parametrelere Etkisi

Özet

Yeni doğan domuz yavrularında, doğal immunomodülatör uygulamasının, sütten kesim öncesi parametrelerine (mortalite oranı, sütten kesim oranı, canlı ağırlık artışı, sütten kesim ağırlığı) etkisi, Sırbistan'da ticari bir işletmede araştırıldı. Deneme grubundaki yavrulara (n=30), oral yolla, doğum sonrası 2 ila 6 saat içerisinde 2.5 mL One Shot immunomodulatör preparatı 24 saat sonrasında ise 1.2 mL Coloron Forte Plus immunomodulatör preparatı uygulandı. Doğum sonrası 7. günden, sütten kesime kadar olan dönemde yavrular, Piggy Guard Forte Plus immunomodulatör içeren başlangıç yemi (15 kgpreparat/ton) ile beslendiler. Kontrol grubundaki yavrulara (n=30) probiyotik uygulaması yapılmadı. Probiyotik uygulanan grupta, kontrol grubuna göre,yavrularda mortalite oranıdaha düşük seviyede tespit edildi (0.27 ve 0.53), (P<0.05).Sütten kesimdeki yavru sayısı, deneme grubunda (9.16) kontrol grubuna göre (8.97) istatistiksel olarak daha yüksek bulundu (P<0.05). Yavruların vücut ağırlığı (8.60 kg ve 7.53 kg) iledoğum sütten kesim arası günlük canlı ağırlık artışı (228 g ve 193.8 g) da muamele grubunda daha yüksek seviyede belirlendi (P<0.01).Bu araştırmanın bulgularına göre, yeni doğan domuz yavrularında, besin yoluyla alınan immunomodülatör katkı maddelerinin, mortalite oranını azaltabileceği ve sütten kesim öncesi büyüme performansını artırabileceği kanaatine varıldı.

Anahtar sözcükler: *İmmünomodülatörler, Mortalite, Büyüme performansı, Sütten kesim öncesi dönem, Yeni doğan domuz*

INTRODUCTION

Piglet mortality is a major factor that produce significant productive and economic losses in the pig industry. Preweaning piglets mortality rate ranges from 11 to 20% in UK, Japan, Denmark, US, Canada and Australia [1].

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In 47 Serbian pig herds, the live born preweaning mortality range from 10 to 12% (aver. 11.06%) [2]. The low viability, starvation and diarrhea have been reported as the major causes of preweaning piglets mortality [3]. Infectious diarrhea is the major infective ethiology cause of piglets mortality within first 7 days after farrowing [4,5]. As the pigs epitheliochorial placenta is impermeable to immunoglobulins (Ig) [6], piglets are born without immune protection [7]. Consequently, protection of neonatal piglets against systemic infection, within first days after birth, is totally dependent on the maternal immunoglobulins, taken by colostrum and milk [8]. However, these maternal immunoglobulins protection is significantly reduced or totally absent in the litters of sows with postparturient disorders, commonly categorized under the terms mastitis-metritis-agalactia (MMA) syndrome [9]. Significant reduction or totally absence of milk production results from inadequate colostrum intake and, consequently, leads to piglets death, primarily due to starvation and hypothermia or infectious diarrhea because of to inadequate transfer of maternal immunoglobulins to the piglets [10].

Given within medicated water, feed additives or injectable preparation, antibiotics are routinely used to reduce the risk for newborn piglets diarrhoea and mortality [11]. However, the resistance to antimicrobial agents [12] and transference of antibiotic resistance genes from animal to human microbiota [13], are the main reason for the limited use of probiotics for prophylaxis and therapy of infectious diseases, as well as for growth promote in newborn piglets [14,15].

The objectives of the present experiment were to determine the effects of oral administration of probiotic immunomodulators, on growth performance and mortality rate in suckling piglets.

MATERIAL and METHODS

The experiment was carried out in one pigs farm, on about 1.200 sows in reproductive herd, located in the AP Vojvodina, Serbia.

Experimental treatment: A total of 60 litters of healthy sows (no clinical signs of the reproductive organs or/and mammary gland diseases at farrowing), were divided into two groups (30 litters/group). Piglets in the first group were treated by orally, given probiotic immunomodulators (HU Hofmann AG-CU, 4922 Bützberg, Switzerland) and those in the second group were not given probiotic immunomodulator. "Hokovit" immunomodulator preparation was used. Each piglet was orally received 2.5 mL of One Shot immunomodulator preparation within 2 h to 6 h after farrowing, and 1.2 mL Coloron Forte Plus immunomodulator preparation 24 h after One Shot treatment. Starting at day 7 after farrowing up to weaning, piglets were fed by using the diet for suckling piglets, supplemented with Piggy Guard Forte Plus immunomodulator preparation (15 kg of preparation/t of diet). Lactation was ended on 32nd day. At the start of experiment (farrowing), litter parameters (average live born piglets per litter and body weight at birth) were not different between the treatment and control group *(Table 1)*.

Immunomodulator preparations: One Shot is a preparation for oral application for piglets at birth, including liquid premium colostrum immunoglobulins, as well as other essential immune substances (transferrin, lactoferrin). Effect of application is to increases the body's natural protective ability against infection. This enhances survival rate and stimulates growth of piglets in the first days after birth. Colorona Forte Plus is a liquid preparation for oral application in the first days of life. It contains natural colostrum, a hydrophobic mikrokapsulated lactic-acid bacteria, chelate form of iron (Fe) and copper (Cu), stabilized Micro GII, fructose and plant extracts. It is used instead of traditional iron supplements and vitamins. The preparation improves piglets health condition, stimulates body weight gain, increases appetite and prevents digestive disorders in newborn piglets. Piggy Guard Plus Forte is an immunomodulator which is applied to piglets via the food, on the 7th day, after birth up to weaning. It contains premium colostrum, amino acids in the chelate form, enzymes, yeast extracts and herbal extracts. It Increases natural immunity, piglets body weight gain and feed conversion ratio during lactation, as well as reduces stress of piglets during the transition to solid feed.

Analysis of data: Descriptive statistics, t-test, analysis of variance (ANOVA) were done in the software package Statistics 10th.

RESULTS

The parameters for probiotic treated and control litters, from farrowing to weaning, are shown in *Table 2*.

Dead piglets per litter, within lactation period, were significantly (P<0.05) higher in the untreated (control) group (0.53) than in the probiotics treated group (0.27). Significantly more (P<0.05) piglets were weaned in the treatment group (9.16), when compared to the control group (8.97).

Table 1. *Litter parameters at farrowing - start of experiment (X ± SD)*
Tablo 1. *Doğum sonrası yavru parametreleri-deneme başlangıcı (X ± SD)*

Parameters	Experimental Groups	
	Tretment	Control
Litters per group (n)	30	30
Total live born piglets (n)	283	285
Live born piglets per litter	9.43±0.94^{NS}	9.50±1.22^{NS}
Piglet body weight at birth, kg	1.31±0.98^{NS}	1.32±1.04^{NS}

^{NS} *Not significant (P>0.05)*

Table 2. *Litters parameters from farrowing to weaning (X ± SD)*
Tablo 2. *Doğum sütten kesim arası yavru parametreleri (X ± SD)*

Parameters	Experimental Group	
	Tretment	Control
Litters per group (n)	30	30
Lactation duration (days)	32	32
Total live born piglets (n)	283	285
Dead piglets per litter within lactation (n)	0.27 ± 0.58^{a}	0.53 ± 0.73^{b}
Total piglets weaned per group (n)	275	269
Weaned piglets per litter (n)	9.16 ± 0.83^{a}	8.97 ± 1.06^{b}
Piglet body weight at weaning (kg)	8.60 ± 0.5^{A}	7.53 ± 0.73^{B}
Piglet daily gain (g)	228.0 ± 16.73^{A}	193.8 ± 3.74^{B}

Values within rows with different superscripts differ: ^{A,B} (P<0.01), ^{a,b} (P<0.05)

Piglet body weight (8.60 kg vs. 7.53 kg) and piglet daily gain (228 g vs. 193.8 g), were significantly (P<0.01) higher in the treated, than the control group.

DISCUSSION

In the intensive pig production, the sows and their litters are confronted to many chronic stressors [16]. Stressors significantly reduce the immunity of animals [17], which significantly increases the susceptibility to infectious diseases [18,19]. Periparturient MAA-syndrome (metritis-mastitis-agalactia) in the sows [9,20], and diarrhea in the newborn piglets [1] are the main infectious diseases. Infectious diarrhea in the suckling piglets is the responsible from the high proportion of mortality and economic losses [21]. To prevent diarrhea and reduce the morbidity and mortality, as well as to promote the piglets growth, antibiotics were used [6]. *However,* long-term use of antibiotics creates resistant pathogenic microorganisms, and it has a negative impact on human health, due to antibiotic residues in animal products [22]. In the recent years, there are attempts to overcoming these negative effects by oraly treatment the piglets with the natural bioactive substances of plant and animal origin, by using immunogenic properties (immunomodulators) [23,24].

Our results demonstrated that individual treatment of newborn piglets by oraly administrated natural immunomodulator preparations can significantly improve the preweaning litter performances. Piglets preweaning mortality were reduced (av. 0.27 vs. 0.53 dead treated, and control group, resp.), resulting with a significant increase in the average weaned piglets per litter (9.16 vs. 8.97). Average piglet body weight at weaning (8.60 kg vs. 7.53 kg) and daily gain (228 g vs. 193.8 g) were also higher in the probiotic treated group, when compared with untreated litters. It has been demonstrated, that treatment with natural immunostimulator preparations [25,28], that contain mannan oligosaccarides [26,32], yeast culture [33] or yeast fermentation products [24,29], herbal extract [23], colostrum, chelate form of iron (Fe) and copper (Cu) [27,31], can prevent newborn piglets deseases and increase litter growth performances [30]. The results in the present study, as well as the results of other authors, indicated that probiotics can serve as a potential replacements of antibiotics and as a growth promoter in pigs. However, because the recent results are still inconsistent [34], more studies are needed to justify the use of probiotics in pig diets.

Based on the results on peroral newborn piglets treatment with natural immunomodulators, it can be concluded that: (1) The treatments significantly decrease piglets preweaning mortality, increase average weaned piglets per litter, piglets daily gain and body weight at weaning. (2) These findings suggest that the application of natural immunodulators can be a practical method to reduce suckling piglets mortality and increase the litter growth performances. The economic losses may reduce in the intensive pig production.

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