Livestock Science 146 (2012) 115–122

Contents lists available at SciVerse ScienceDirect

Livestock Science

journal homepage: www.elsevier.com/locate/livsci

Influence of pig weight classification at cross-fostering on the performance of the primiparous sow and the adopted litter

T. Bierhals [a], D. Magnabosco [a], R.R. Ribeiro [a], J. Perin [a], R.A. da Cruz [a], M.L. Bernardi [b], I. Wentz [a], F.P. Bortolozzo [a,*]

[a] Universidade Federal do Rio Grande do Sul (UFRGS), Faculdade de Veterinária, Setor de Suínos, Av. Bento Gonçalves 9090, CEP 91540-000, Porto Alegre, RS, Brazil
[b] UFRGS, Faculdade de Agronomia, Departamento de Zootecnia, Av. Bento Gonçalves 7712, CEP 91540-000, Porto Alegre, RS, Brazil

ARTICLE INFO

Article history:
Received 29 March 2011
Received in revised form
24 February 2012
Accepted 25 February 2012

Keywords:
Cross-fostering
Primiparous
Piglets
Weight
Reproductive performance

ABSTRACT

The objective of this study was to evaluate the effects of piglet weight and variation in weight at cross-fostering on piglet and sow performance. Primiparous sows were allocated in three groups: group A ($n=31$)—litters with 14 Light piglets (1.0–1.2 kg); group B ($n=32$)—litters with seven Light piglets and seven Intermediate piglets (1.4–1.6 kg), and group C ($n=31$)—litters with 14 Intermediate piglets. Sows were weighed within 24 h after farrowing and on days 7, 15 and 19 of lactation. Feed intake was measured daily during lactation. Subsequent weaning-to-oestrus interval (WOI), farrowing rate and litter size were evaluated. Piglets were weighed at cross-fostering and on days 7, 15 and 19 of lactation. Average daily feed intake, body reserves at farrowing and weaning, and body reserve losses of sows during lactation were similar among groups ($P>0.10$). Litter weight differed among groups, at all moments of evaluation, with the higher weight being observed in C group ($P<0.05$). Daily gain of litter was similar among groups ($P>0.10$). Survival rates up to 7 and 19 days were similar among groups ($P>0.10$). The percentage of sows showing oestrus until Day 7 after weaning was lower ($P=0.03$) and WOI tended to be higher ($P=0.08$) in group C compared to group A. Farrowing rate and second litter size were similar among groups ($P>0.10$). Sows with WOI > 7 days had similar number of weaned piglets, feed intake and body reserve losses ($P>0.10$) to those with WOI ≤ 7 days. However, long WOI sows had heavier litters at weaning and higher lactation efficiency than short WOI sows ($P<0.05$). In conclusion, WOI can be compromised in sows suckling litters composed entirely of Intermediate piglets compared to litters composed of Light piglets. This effect seems to be mediated by a greater intensity of sucking by heavier piglets rather than by greater body reserves mobilisation.

1. Introduction

Increased litter sizes may be a challenge for subsequent post-lactational performance, since the increased intensity of suckling stimuli from the piglets during lactation inhibits the activity of the HPO axis (Cox and Britt, 1982). Earlier resumption of follicular development and return to oestrus can be obtained by diminishing the suckling stimulus through intermittent suckling, split weaning or reducing the number of piglets (Quesnel et al., 2007; Gerritsen et al., 2008; Zak et al., 2008; Gerritsen et al., 2009). These strategies could be used to shorten the interval to oestrus after weaning, especially in primiparous sows which represent a substantial proportion of females in commercial pig herds (Straw, 1984). Primiparous sows

* Corresponding author. Tel.: +55 5133088044; fax: +55 5133086132.
E-mail address: fpbortol@ufrgs.br (F.P. Bortolozzo).

1871-1413/$ - see front matter © 2012 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.livsci.2012.02.026

are highly susceptible to body reserve losses (Noblet et al., 1998), which implies in a likely impairment of their subsequent reproductive performance (Vesseur et al., 1994; Schenkel et al., 2010). Nevertheless, the higher demand for teats as a consequence of a higher number of piglets born from hyperprolific sows has resulted in attempts to maximise the number of suckling piglets even in primiparous sows.

A greater stimulus to the mammary complex and a higher milk production can be induced by increasing the number of piglets (Fraser et al., 1992; Smith et al., 1992; Auldist et al., 1998; Nielsen et al., 2002) or using piglets with a higher body weight (Fraser, 1984; King et al., 1997). Cross-fostering is used to obtain litters with a similar number of piglets or with homogeneous weight, which increases the survival and weight gain of piglets until weaning (Robert and Martineau, 2001). In pluriparous sows, the survival rate of low-birth weight piglets can be reduced when cross-fostered with heavier littermates (Milligan et al., 2001; Deen and Bilkei, 2004) but there is a lack of information regarding the viability and performance of litters composed of piglets with different weight, in primiparous sows.

Our hypothesis for the study was that heavier litters at cross-fostering could result in a high body reserve mobilisation which in turn could affect the litter performance and/or the reproductive performance of modern genotype primiparous sows. The inhibitory effects on the HPO axis activity due to the lactational catabolism cannot be separated from those due to the suckling per se because metabolic needs for milk production as well as stimuli originating from the piglets may affect LH secretion, follicle development, and oestrus manifestation after weaning (Quesnel and Prunier, 1995). It is relevant to study the effect of suckling-induced neuroendocrine reflexes when udder is stimulated by large litters composed of different birth weight piglets in addition to the effect of a negative energy balance so that the size of piglets to obtain better performance of both mother and litter can be determined for primiparous sows.

The objective of this study was to evaluate the effect of cross-fostering piglets with different birth weights on feed intake, body reserve losses and reproductive performance of primiparous sows and on the performance of adopted litters until weaning.

2. Materials and methods

2.1. Animals, facilities and general management practices

The study was performed with primiparous sows (DB—DanBred® line—Landrace × Large White) in a farm with 5000 females in the South Region of Brazil (parallel 27°), from January to April 2010, during the hot season of this subtropical region. Rainfall ranged from 136 to 170 mm/month. Average daily temperature ranged from 18.8 to 21.4 °C whereas average minimum and maximum temperatures were 19.5 °C (range from 13.0 to 24.5 °C) and 30.3 °C (range from 22.0 to 37.5 °C), respectively. Air humidity averaged 76.2% (range from 31 to 99%), with 80% of the days reaching a value of $\geq$ 70%.

During pregnancy, gilts were automatically fed twice a day with a corn soybean diet (3000 kcal ME/kg, 16.2% CP and 0.84% lysine). Between 0 and 5 days of gestation (day 0 = day of first AI) females received 1.8 kg of feed per day. From 6 to 85 days of gestation, 1.8, 2.0 or 2.2 kg of feed per day was provided according to the body condition score of the sows (Young et al., 2004). After this, they were fed 3.3 kg with a gradual reduction in the quantity provided, from 3.3 kg (5 days before the expected farrowing) to 1 kg (1 day before the expected farrowing). After farrowing, sows were fed a corn soybean lactation diet (3330 kcal ME/kg, 20.1% CP and 1.1% lysine). Water was provided ad libitum to females throughout the study.

The farrowing house had a full plastic slatted floor and consisted of 16 rooms with 64 farrowing crates in each. Crates were equipped with water nipples placed above the trough with an average flow rate of 2–2.5 l/min and with automatic feeders allowing sows to have free access to feed during all the time (ad libitum). Automatic feeders had a reservoir above the trough and feed fell through a pipe in the trough. In the inferior end of the pipe there was a ball which when rolled by the sow allowed that feed fell in the trough. It was possible to place approximately 8 kg of feed (reservoir + pipe). The automatic feeders were checked twice a day and when necessary more feed was weighed and placed in the reservoir. Refusal was daily collected (at 2:00 PM) and weighed. Feed refusals were usually wet and a sample of 80 g was dried for approximately 6 h at 105 °C. Based on the feed amount in the dried sample, the amount of feed refusal was calculated and discounted from the offered amount to obtain the actual average daily feed intake (ADFI). Creep feed was not available for piglets.

Farrowing induction was performed 114 days after first insemination using 0.06 mg PGF2-alfa analogue injection (Dinoprost Tromethamine, Lutalyse®; Pharmacia & Upjohn, México O.F., Mexico) by vulvar submucosal route. Farrowings were concentrated in no more than two rooms and were supervised 24 h a day by 3 people per farrowing room during the day and 2 people during the night.

After weaning, females were housed in individual crates in the gestation building, which had a casting concrete floor. Oestrus detection was performed daily by back pressure test in the presence of mature boars (older than 12 months). The sows were inseminated with pooled semen doses containing 3 billion sperm cells diluted in BTS extender (Beltsville Thawing Solution—MINITUB®, Tiefenbach, Germany). The semen doses were stored at 15–18 °C and were used for AI within a maximum of 72 h. The first AI was performed around 6 h after the onset of oestrus and then every 24 h until sows were no longer in standing oestrus.

2.2. Study design

Females with return to oestrus or abortion after AI when gitls, and those with locomotor disorders, abscesses or with less than 14 functional teats were not included in the study. Three groups of primiparous sows were formed: group A—litters with 14 Light (1.0–1.2 kg) piglets; group B—litters with seven Light piglets and seven of Intermediate (1.4–1.6 kg) piglets, and group C—litters