Analysis of water, feed intake and performance of lactating sows

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ABSTRACT

The aim of the present study was to investigate the relationship between water, feed intake, relative body weight loss, and the weaning weight of piglets of lactating sows and to analyse the curves of water and feed intake. Data recording was performed on the Hohenschulen research farm of the Institute of Animal Breeding and Husbandry of the University of Kiel between April 2007 and June 2008. The sow herd had a size of 105 productive sows. The average water and feed intake, relative body weight loss of sows and the weaning weight of the piglets were 27.5 l day \(^{-1}\), 5.9 kg day \(^{-1}\), 0.5% and 8.7 kg, respectively. Average lactation length was 26 days. Water intake increased from day 1 to day 16 of lactation and remained constant until weaning. Second parity class sows had an increased water intake over the lactation period compared to younger and older sows. They also consumed more feed than older sows (6.1 kg day \(^{-1}\) versus 5.7 kg day \(^{-1}\)). The water-to-feed ratio decreased at the beginning until day eight of lactation. After a slight increase the water-to-feed ratio remained constant. The lactation period was divided into three stages (Stage 1: days 1 to 8 of lactation, Stage 2: days 9 to 16 and Stage 3: days 17 to 26). The correlation of water intake between adjacent stages was high 0.76 and 0.80. The relation of feed intake between Stages 1 and 2 and between Stages 1 and 3 was low. The correlation of the water and feed intake within the stages increased more than between these traits and different stages. But the negative values indicated that an increased water intake decreased the relative body weight loss. The relation between the second and third stages of feed intake of lactation and relative body weight loss showed that an increased feed intake decreased relative body weight simultaneously with an increase in the weaning weight of the piglets.

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1. Introduction

An adequate water and feed intake is important for sow health (Neil et al., 1996), performance and reproduction (Koketsu et al., 1997). Several studies have shown that an increased feed intake decreases body weight loss, increases litter performance and backfat depth (Eissen et al., 2003; Le Cozler et al., 1999; Peng et al., 2007; Prunier et al., 1997). The feed intake of sows is measured automatically on many farms whereas water intake, the weaning weight of piglets or the weight loss of sows are observed only on research farms. Water is used to excrete metabolism wastage via urine (Pfeiffer et al., 1995), for growth, (Schiavon and Emmans, 2000), for digestion and it is the major component of milk (Klobasa et al., 1987). The average water consumption varies in literature. Peng et al. (2007) measured a daily water consumption of lactating sows of 17.2 l day \(^{-1}\), Bauer (1982) and Oliviero et al. (2009) observed 19.9 and 20.2 l day \(^{-1}\), respectively, during the lactation period. Quiniou et al. (2000) measured a water intake of 27.0 l day \(^{-1}\) between days 7 and 19 of lactation. Water intake is influenced by feed composition (Oliviero et al., 2009; Robert et al., 1993), amount of feed intake (Seynaeve et al., 1996) and ambient temperature (Quiniou et al., 2000). Fraser and Phillips (1989) estimated a positive correlation between the water intake of sows and their piglets' weight gain indicating a positive effect on sow performance. To our knowledge no literature is available which has observed the relationship of...
water intake with feed intake, relative body weight loss and weaning weight of piglets. Rare information has been found concerning the water intake of different parities (Friend, 1971). The aim of the present study was to analyse the pattern of water and feed intake during the lactation period and to establish the relationship between water intake and feed intake, relative body weight loss and the weaning weight of piglets.

2. Materials and methods

2.1. Animals and housing

Data were recorded on the Hohenschulen research farm of the Institute of Animal Breeding and Husbandry of the University of Kiel between April 2007 and June 2008. The sow herd had a size of 105 productive sows (Large White, German Landrace and their crossbreeds) with 122 lactations in parities 1 to 6. Data were measured in the farrowing unit, beginning at the day of farrowing until the day of weaning. Sows were housed in farrowing crates diagonally ordered with eight sows per farrowing unit. The farrowing pens were of homogeneous type (1.7 x 2.2 m) and had a slatted floor for the sows with a concrete area for the piglets. Lactation length was 26 days on average. One week before the expected farrowing day, the sows were weighed, washed and housed into the farrowing unit. During the week of farrowing the body temperature was measured rectally with a clinical thermometer. A total of 49 sows were treated for Mastitis, Metritis and Agalactia (MMA) due to a body temperature higher than 39.5 °C.

The compartment temperature was monitored by a climate computer that controlled the ventilation system to maintain a constant room temperature of between 20 °C and 22 °C. The body weight and sex of each piglet were recorded within the first 24 h after birth. The piglets were given iron (III) hydroxide orally, male piglets were castrated and large litters were cross-fostered within the first week of life. The piglets had free access to water and feed was provided beginning at day seven to adapt them to conventional feed. Floor heating and an additional heating lamp were provided for the piglets for the first days of life.

2.2. Recorded traits

The sows had free access to water, which was provided by a nipple drinker inside the feeder. The water intake of each sow in the farrowing unit was measured by water flow meters. A sensor in the water flow meter produced a flow proportional frequency and was connected to a digital counter. The water consumption of each sow was recorded every morning. The water flow meter provided an accuracy of 2% of full scale i.e. the variation was 2% of the daily water intake of each sow. Water pressure was 2 bar, the mean water flow was 5.8 l/min (s = 1.2). Extreme values that deviated more than ±4 s.d. from the mean of the measured data were excluded from the data sets (i.e. 26 of 3067 water intake observations).

Lactating sows received a commercial lactation feed (18.5% crude protein, 6.8% crude fat, 4.7% crude fibre, and 13.6 MJME/kg DM) according to the German norm (GfE, 2006). The diet is shown in Table 1 with barley and soybean meal as the main ingredients. The feed intake of the sow was recorded on a daily basis. Each sow had an individual demand of feed that was adapted to litter size and individual body condition. The feed was divided into three meals per day. In the morning, the sows were allowed to receive 40% of the daily demand, 30% at midday and 30% in the afternoon. The single meals started at 0600 h, 1300 h and 1800 h every day. Feed was provided in a container (one container for two sows), the container was refilled automatically. Before feeding the sow had to activate a mechanism that offered 50 g feed per activation. Primiparous sows received 2.0 kg and multiparous sows 2.5 kg feed per day with a gradual increase of up to 9.1 kg feed per day. Every day the daily demand and the actual feed intake of each sow were saved in a computer.

Additionally, the water-to-feed ratio was calculated, by dividing water intake by feed intake. The sows were weighed before moving into the farrowing unit and at weaning to calculate the body weight loss as the difference between weight after farrowing (weight before farrowing minus litter weight at the day of birth) and weight at weaning. To obtain the relative body weight loss of the sow (RWL), the body weight loss was divided by the weight after farrowing according to Tantasuparak et al. (2001). Piglets born alive were recorded on the day of farrowing (x = 11.4; s = 3.2, Table 2). Stillborn piglets were regarded as dead if they were found already dead during farrowing, or the next morning if the sow farrowed during the night (x = 1.2; s = 1.5, Table 2). The individual body weight of the piglet was recorded at weaning.

2.3. Statistical analysis

Statistical analysis was performed using SAS (2005). The model for water and feed intake as well as the model for water-to-feed ratio was designed with the fixed effects of parity, days of lactations and their interaction. Parity was divided into three classes: first parity (38 sows), second parity (31 sows), and third and higher parities (53 sows). Days of lactation represented the days after farrowing (1,..., 26). The effects were tested for significance by the F-test implemented in the mixed-procedure in SAS (2005). In a following step, the batch effect, the breed and the compartment temperature were added as fixed effects to the model, stepwise. The batch effect included the group of sows farrowed during one week and the farrowing compartment. The breed was divided into cross-bred and pure breeds. The compartment temperature was included as a linear regression. Maximum Likelihood (ML) was used to test the different models. The information criteria of Hurvich and Tsai (1989) (AICC, Akaike's information criteria corrected) and Schwarz (1978) (BIC, Bayesian information criteria) were used for the comparison. These values take into account the number of parameters estimated and favour less

<table>
<thead>
<tr>
<th>Main ingredient</th>
<th>Weight percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barley</td>
<td>46.00</td>
</tr>
<tr>
<td>Soybean meal, dehulled</td>
<td>15.50</td>
</tr>
<tr>
<td>Corn</td>
<td>6.00</td>
</tr>
<tr>
<td>Linseed, extruded</td>
<td>5.50</td>
</tr>
<tr>
<td>Wheat</td>
<td>5.00</td>
</tr>
<tr>
<td>Soya oil</td>
<td>3.30</td>
</tr>
<tr>
<td>Brewers yeast</td>
<td>3.00</td>
</tr>
<tr>
<td>Oat</td>
<td>2.60</td>
</tr>
</tbody>
</table>
complex model variants. The model with the smallest values for AICC and BIC was selected without making a statement about the underlying significance. The final model for water, feed intake and water-to-feed ratio included the fixed effects of parity class, batch, lactation day within parity class, compartment temperature and the random effects of the sow.

\[ y_{ijkl} = PC_i + DL_{ij} + FB_k + s_l + b^{\text{temp}_{ijkl}} + e_{ijkl} \]

where \( y_{ijkl} \) denotes the observations of water intake (1 day\(^{-1}\)), feed intake (kg day\(^{-1}\)) and water-to-feed ratio (l kg\(^{-1}\) day\(^{-1}\)), \( PC_i \) the fixed effect of the ith parity class (i=1, ..., 3), \( DL_{ij} \) the fixed effect of the jth day of lactation (j=1, ..., 26) within parity class, \( FB_k \) the fixed effect of the kth batch (k=1, ..., 20), \( s_l \) the random effect of the lth sow (l=1, ..., 105), b the common slope of the model for the compound temperature effect \( (\text{temp}_{ijkl}) \) and \( e_{ijkl} \) the residual term.

The error covariance was modelled due to the fact that repeated daily measurements within the lactation of sow were assumed to contain autocorrelated repeated measures (Kramer et al., 2008b; Littell et al., 1998; Littell et al., 2006). The covariance of the residual term was modelled with the spatial (exponential) structure (SP(EXP)). The correlation declined as a function of time, which was defined as \( g_{\text{exp}}(d) = e^{-\theta d} \), where \( \theta \) an unknown covariance parameter and \( d \) was the distance between two measurements at time \( t_1 \) and \( t_2 \), \( d = |t_1 - t_2| \). The SP(EXP) structure modelled the covariance between \( t_1 \) and \( t_2 \) as covariance of two measurements \( Cov[Y_{t_1}, Y_{t_2}] = \alpha_1^2 + e^{-\theta (t_1-t_2)} \), where \( \alpha_1 \) and \( \alpha_2 \) were the measurements at time point \( t_1 \) and \( t_2 \) and \( e^{-\theta (t_1-t_2)} \) was the error variance. The SP(EXP) covariance structure was chosen because this structure is able to analyse data with missing values (7, 68 and 132 for feed, water intake and water-to-feed ratio respectively) (Littell et al., 2006). The significance of differences in LSQ-means (least square means) was adjusted with the Bonferroni-correction.

The lactation period was divided into three stages in order to detect varying correlations during lactation (Quesnel et al., 2009). Lactation Stage 1 included observations within parity class from lactation days 1 to 8, the second and third from 9 to 16 and 17 to 26, respectively. To estimate the correlation between the sow effects of the different stages of lactation the analysis was performed with the fixed effects of parity class, day of lactation within parity class, batch effect, random effect of sow and the residual and common slopes of the model for the compartment temperature effect.

Finally, the model for relative body weight loss of the sow and piglets weaning weight was designed analogously to the models of water, feed intake and water-to-feed ratio. A linear regression on lactation length was included to take the different lactation length into account. The models included parity class, batch and the linear regression on the lactation length and the random effects of the sow.

\[ y_{ijkl} = PC_i + FB_j + s_k + b^*d_{ijkl} + e_{ijkl} \]

where \( y_{ijkl} \) denotes the observations of relative body weight loss and litter weaning weight, \( PC_i \) the fixed effect of the ith parity class (i=1, ..., 3), \( FB_j \) the fixed effect of the jth farrowing batch (j=1, ..., 20), b the linear regression of the lactation length (d_{ijkl}), s_k the random effect of the kth sow (k=1, ..., 105) and \( e_{ijkl} \) the residual term.

The repeatability was calculated as the variance between sows (sow effect) divided by the sum of variance between and within sow(s). The Pearson correlation was estimated between sow effects using the procedure CORR of SAS (2005).

### 3. Results

#### 3.1. Preconditions for linear mixed models

The frequency plot of the residuals was visualised in order to detect deviations from a normal distribution for all three traits. Additionally, homogeneity of variance of the residuals was judged by visual inspection of the plots of the standardised residuals against the predicted values. Residuals were normally distributed with homogenous variance over the whole range of the predicted estimates.

#### 3.2. Influences of parity class and lactation day on recorded traits

The mean water intake per day was 27.5 l day\(^{-1}\) (s=10.4, Table 2). Parity class, farrowing period, day of lactation within parity class and compartment temperature all had significant influences (p<0.05) on water intake. Second parity class sows had a higher water intake than younger or older sows (Table 3). Fig. 1 shows the least square means (LSM) of water intake during lactation period. Water intake increased from the first to the sixteenth day of lactation and remained constant until weaning. During the first 5 days of lactation, second parity class sows had a higher slope of water intake than younger or older sows. The course of the different parity classes was similar in the further lactation period.

The mean feed intake was 5.9 kg day\(^{-1}\) (s=1.8) during the lactation period. Feed intake was significantly influenced by parity class, batch and day of lactation within parity class. Second parity class sows received significantly more feed than third parity class sows (Table 3). Feed intake increased gradually until the ninth day of lactation and remained constant until weaning (Fig. 2). During the first week of lactation primiparous sows received marginally more feed than older sows.

The mean water-to-feed ratio was 4.9 (s=1.9). The day of lactation and compartment temperature had significant influences on the water-to-feed ratio. The water-to-feed ratio decreased from the beginning of the lactation until day eight of lactation, the course had a slight increase until day 16 of lactation and remained constant until weaning (Fig. 3). As expected, the water-to-feed ratio increased with increasing compartment temperature (Table 3).

### Table 2

<table>
<thead>
<tr>
<th>Trait</th>
<th>x</th>
<th>s</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water intake (1 day(^{-1}))</td>
<td>3041</td>
<td>27.5</td>
<td>10.4</td>
<td>69.5</td>
</tr>
<tr>
<td>Feed intake (kg day(^{-1}))</td>
<td>3102</td>
<td>5.9</td>
<td>1.8</td>
<td>9.1</td>
</tr>
<tr>
<td>Water-to-feed ratio (l kg(^{-1}) day(^{-1}))</td>
<td>3034</td>
<td>4.9</td>
<td>1.9</td>
<td>24.8</td>
</tr>
<tr>
<td>Relative body weight loss (%)</td>
<td>122</td>
<td>0.5</td>
<td>4.6</td>
<td>12.2</td>
</tr>
<tr>
<td>Weaning weight (kg/piglet)</td>
<td>1178</td>
<td>8.7</td>
<td>1.7</td>
<td>14.5</td>
</tr>
<tr>
<td>Piglets born alive</td>
<td>122</td>
<td>11.4</td>
<td>3.2</td>
<td>2</td>
</tr>
<tr>
<td>Piglets stillborn</td>
<td>122</td>
<td>1.2</td>
<td>1.5</td>
<td>0</td>
</tr>
<tr>
<td>Piglets weaned</td>
<td>122</td>
<td>9.7</td>
<td>2.9</td>
<td>2</td>
</tr>
<tr>
<td>Lactation length (day)</td>
<td>122</td>
<td>26.0</td>
<td>1.2</td>
<td>30</td>
</tr>
</tbody>
</table>
The mean relative body weight loss was 0.5% (s=4.6%, Table 2). Parity class had no influence on the relative body weight loss (p N 0.05).

Both batch and parity classes had a significant effect on the weaning weight of piglets (x− =8.7; s=1.7, Table 2). As expected, piglets of the second parity class sows had a significantly higher weaning weight than first parity class sows (Table 3). There was a tendency for third parity class sows to have heavier piglets than first parity class sows (p=0.06).

3.3. Repeatability and correlation between water, feed intake, relative body weight loss and weaning weight

The repeatability of water intake of the whole lactation period was moderate (w=0.58, Table 3), which indicated a moderate to high variation between the sows. Feed intake had a low repeatability (w=0.06) due to the restricted feeding. The high value of the autocorrelation (ρ =0.78) indicated the importance of modelling the error covariance. Relative body weight loss and the weaning weight of piglets had low repeatability (Table 3).

Correlations of water intake between different stages varied between 0.68 and 0.80. Correlations were higher at r =0.76 and 0.80 between adjacent stages (Table 4). Due to restricted feeding, the relationship between the feed intake of Stages 1 and 2 as well as between Stage 1 and 3 was low. Correlations between the traits (water and feed intake) within stages (diagonal) showed higher values (0.45, 0.61 and 0.65, respectively) than between traits and different stages (Table 4).

The relationship between different stages of water intake and relative body weight loss varied between −0.17 and −0.29 indicating that an increasing water intake reduced the relative body weight loss. The weaning weight of piglets was positively correlated with water intake (Table 4). The first stage of water intake showed a lower relationship than the other stages.

As expected, the correlation between the feed intake at the beginning of lactation (first stages) and relative body weight loss was low, whereas the relationship between Stages 2 and 3 and relative body weight loss increased. Comparable results were found between feed intake and weaning weight indicating that feed intake of the mid and later stages also increased the weaning weight of piglets.

There was a positive relationship between weaning weight and relative body weight loss (r =0.20) indicating that body weight loss of sows increased the weaning weight of piglets.

4. Discussion

4.1. Feed intake

The average feed intake of lactating sows varies in the literature depending on breeds (Koketsu et al., 1996), feeding system, housing and temperature (Silva et al., 2006). Most studies with Large White and Landrace sows have observed an ad libitum daily feed intake of 6.0 kg day−1 (Lauridsen and Danielsen, 2004; Peng et al., 2007; Quiniou et al., 2000), which was comparable to the present results (x =5.9, Table 2).
indicating that the restricted feeding in the present study was close to ad libitum. In general, restricted feeding should adapt the gastrointestinal tract during the first days after farrowing to high feed intake for the following lactation period (Dourmad, 1991).

First parity class sows had a lower feed intake than second parity class sows both parity classes received more feed than third parity class sows. The reason might be that first and second parity class sows had to grow in contrast to third parity class sows. The differences between first and second parity class sows might be due to a higher feed intake capacity of second parity class sows. Second parity class sows received more feed than third and higher parity sows because they still had to grow, therefore, they had an increased energy demand for growing and increased weaning weight of piglets than adult sows (Emmans, 1997).

The feeding curve increased during the first week of lactation and remained constant until weaning (Fig. 2). This course was also observed by Weldon et al. (1994), Prunier et al. (1997), Revell et al. (1998) and Farmer et al. (2006).

The variation in temperature did not influence the feed intake because the sows were able to compensate the slight increase in temperature by consuming additional water (Schiavon and Emmans, 2000).

The low repeatability of feed intake showed that the variation between sows was low because the sows received similar amounts of feed. The variation within sow was higher than the variation between sows because the feed intake within sow varied between the days.

4.2. Water intake

The mean water intake of the present study was more than 7 l day$^{-1}$ higher than the observed water intake of Fraser and Phillips (1989), Seynaeve et al. (1996) and Bauer (1982). Water wastage could have been one reason for the differences but all studies used similar water systems and the water wastage should have been comparable. Eisen et al. (2000) pointed out that genetic and environmental effects increased sows’ milk production, which was also supported by the studies of Noblet and Etienne (1987), Nissen et al. (2003) as well as Silva et al. (2006). According to these studies, the milk yield increased from 7.1 l day$^{-1}$ (Noblet and Etienne, 1987) to 8.2 and 8.1 l day$^{-1}$ (Nissen et al., 2003; Silva et al., 2006) over time. To produce the higher amount of milk, sows had to increase their water intake since it is the major ingredient of milk (Jeon et al., 2006; Klobasa et al., 1987).

In addition, Seynaeve et al. (1996) pointed out that the elevated feed intake could have been a reason for increasing water intake during the first few days because additional feed needed additional water for digestion (Pfeiffer et al., 1995; Schiavon and Emmans, 2000).
Table 4
Correlations between the different stages of water and feed intake and relative body weight loss and the weaning weight of piglets.

<table>
<thead>
<tr>
<th>Water intake</th>
<th>Feed intake</th>
<th>Relative body weight loss</th>
<th>Weaning weight of piglets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 2 (9–16)</td>
<td>Stage 3 (17–26)</td>
<td>Stage 1 (1–8)</td>
<td>Stage 2 (9–16)</td>
</tr>
<tr>
<td>Water intake</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage 1</td>
<td>0.76 a</td>
<td>0.68 a</td>
<td>0.80 a</td>
</tr>
<tr>
<td>Stage 2</td>
<td>0.33 a</td>
<td>0.61 a</td>
<td>0.65 a</td>
</tr>
<tr>
<td>Stage 3</td>
<td>0.17</td>
<td>0.52 a</td>
<td>−0.26 a</td>
</tr>
<tr>
<td>Feed intake</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage 1</td>
<td>0.37 a</td>
<td>0.22 a</td>
<td>−0.17</td>
</tr>
<tr>
<td>Stage 2</td>
<td>0.75 a</td>
<td>0.37 a</td>
<td>0.29 a</td>
</tr>
<tr>
<td>Stage 3</td>
<td></td>
<td></td>
<td>−0.33 a</td>
</tr>
<tr>
<td>Relative body weight loss</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant correlation (Pearson) of sow effect (p < 0.05).

The water intake curve showed an expected course with an increasing pattern and reached a plateau similar to other studies (Damgaard et al., 2009; Fraser and Phillips, 1989; Seynaeve et al., 1996). The time to reach the plateau was in line with Seynaeve et al. (1996). Fraser and Phillips (1989) observed a shorter duration to reach the plateau due to the lower level of water intake.

The repeatability of water intake was moderate (w = 0.58). The variation of water intake between sows was higher than the variation within sow. The reason for the higher variation between sows might be that some sows played with the water while other sows did not.

4.3. Water-to-feed ratio

The water-to-feed ratio has been observed only in a few studies (Friend, 1971; Quiniou et al., 2000; Renaudeau et al., 2002; Seynaeve et al., 1996). The authors evaluated the average water-to-feed ratio of the lactation period which ranged between 2.81 (kg day)^{-1} and 4.41 (kg day)^{-1}. The present results showed that the water-to-feed ratio declined until day eight of lactation from 7 to 4 l water kg^{-1} feed with an average of 4.9 l water kg^{-1} feed. From day 9 to day 15 of lactation, the slight increase could indicate an adaptation of the gastrointestinal tract to water and feed intake (Dourmad, 1991). If sows had been adapted to the high amount of feed and water, the water-to-feed ratio remained more or less constant.

4.4. Relative body weight loss and weaning weight

In the present study first parity sows gained weight (negative body weight loss) during the lactation period followed by less weight loss of older sows (1.5% and 2.2%, respectively).

These results are not in line with the study of Revell et al. (1998) and Lauridsen and Danielsen (2004). Revell et al. (1998) observed that primiparous sows lost three per cent body weight during lactation. This was supported by the results of Lauridsen and Danielsen (2004), who measured a weight loss of 6.7 kg under comparable conditions. A greater difference was observed between the present study and the measurements of Tantasuparuk et al. (2001). The relative body weight loss ranged between 10.1% and 14.7%. The main reason could have been the feeding management since the authors fed the sows less compared to the present study. Their sows received 2.5, 3.5, 4 and 5 kg feed during the 4 weeks of lactation (Tantasuparuk et al., 2001). In contrast, the sows in the present study received 2.5 up to 9.1 kg day^{-1} in the present study.

4.5. Correlations between water, feed intake, relative body weight loss and the weaning weight of piglets

Correlations of water intake between different stages declined with greater distance between the stages of lactation (Kramer et al., 2008a). The low correlations of feed intake between the beginning and the middle and between the beginning and the end of lactation indicated that the feed intake at the beginning was a different trait from the feed intake at the middle and the end of lactation.

Water intake and relative body weight loss were negatively correlated. A positive relationship was estimated between water intake and weaning weight of piglets. As expected, the correlation increased during mid and later lactation due to the positive relationship between water and feed intake.

The correlation between feed intake and relative body weight loss indicated that increasing feed intake decreased the relative body weight loss. Restricted feeding at the beginning did not influence relative body weight loss and increasing feeding might be a good strategy to adapt the gastrointestinal tract to higher feed amount. The higher relationships between relative body weight loss and feed intake at the middle and end of lactation indicated the importance of enhanced feed intake during mid and later lactation due to optimal body conditions. High weight loss during lactation increased the weaning-to-service interval (Koketsu et al., 1997). Increasing feed intake during mid and later lactation enhanced the weaning weight of piglets whereas the feed intake at the beginning had no effect.

The present study showed that an increased water and feed intake decreased the relative body weight loss and increased the weaning weight of piglets. With increasing litter size sows had to eat higher amounts of feed, which is limited by the feed intake capacity. A higher feeding frequency might be an alternative to increase daily feed intake (Wehebrink et al., 2006).

5. Conclusion

Water and feed intake had an increasing pattern at the beginning of lactation and reached a plateau at day 16 of water intake and day 9 of feed intake. Both traits were positively
correlated with the weaning weight of piglets indicating that an enhanced feed and water intake increased weaning weight. Furthermore, an increased water and feed intake decreased the relative body weight loss, which had a positive effect on subsequent reproduction.

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References


