Silage for gestating sows

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For gestating sows, it is possible to substitute 10 % of concentrate with grass silage, without impact zootecnic performance and animal welfare.
A comparative study were conducted for 1 year in the experimental farm « Les Trinottières » (CA 49) to assess zootecnic, economic and animal welfare impact of the use of silage in gestating sow feeding system.

MATERIEL AND METHODS

Six groups of sows (each groups were divided in 2 batches ; 1 with silage and 1 with control diet) were conducted since april 2012 to may 2013. 2 genotypes of sows were used during experimental design : LW x LF (large white x french landrace) and (LF x DR) x LW (3ways Duroc). Silage were give out each days, refusals were weighted and excluded. Sows with silage feeding system ("Silage") were fed with 90 % of useful level of concentrate (in comparison with "Control") and silage (50 % DM) ad libitum. Animal welfare were assessed with behavioral observation (during 3h30 ; 30 minutes before feeding ; 5 min sequences per batch of sow), for 2 groups of sow (april 2012 to august 2012). Observations were divided with "activity scan" (to observe the behavior of each sow ; pasturing, sleeping, running, feeding…) and "continuous" (to observe the social interactions ; attack, run away…). Silage were used because it is flexible to harvest during spring (cut before the arrivals of the sows on the grassland), and it is quite easy to distribute (individuals bales). For easier work, silage weren't chopped (same materials for dairy cows in the experimental farm).

RESULTS

Nutritional value of silage

Nutritional value of silage harvest for the trial is shown on the table 1.

Table 1 : Nutritional value of concentrate and silages

	Concentrate (per kg)	Silage (per kg of DM)	Silage Noblet *et al*, unpublished (per kg of DM)
EN (mj)	9,29	-	
ED (mj)	13,08	-	10,16
CP (g)	140	**88,5**	175.6
Cellulose brute (g)	64	225,2	293
NDF (g)	192	470,1	535
ADF (g)		258,4	322
ADL (g)		33,8	29
DM (%)		50,9	49,5

The protein content of the harvested silage is very low because there were a few part of white clover in grassland and the cut were too late. For example, the silage used for a study of *Noblet and al* (unpublished) had a higher protein content (175,6 g/kg of DM vs 88,5 g/kg of DM). In vivo digestibility of silage were measured: among 50 % percent for energy and protein (*Noblet and al* ; unpublished).

A high variabilty of the intake by sows

The trials shoo that the consumption of silage is extremely variable between groups. Although the trial does not allow to estimate statically the impact of the various factors on the consumption of silage, we can make the hypothesis that the consumption of silage is positively influenced by :

- a high rank of the sows ;
- a low availability of hugh grass quality ;
- a decrease of the distribution of concentrate ;
- a low pluviometry to favor the appetition of silage.

Table 2 : Feed consumption by group of sows

Group	Parity	Season	Concentrate (kg per sow)	Silage intake (kg per sow)
C212e (n=10)	**2,5**	**June - August**	**3,15**	**0,595**
A212e (n=6)	**6**	**July - September**	**2,7**	**1,580**
B113e (n=8)	**5,75**	**September - November**	**2,7**	**1,070**
C113e (n=9)	**3**	**October - January**	**3,15**	**0,693**
A113e (n=9)	**1,4**	**January- March**	**3,6**	**0,298**
B213e (n=10)	**1,7**	**Ferbruary - May**	**3,15**	**0,237**

Mainenance of zootecnic performances

Concerning pregnancy, groups with silage realized the same weight gains and ELD gain as the control groups (with a tendency to superior performances). There is a high variability of sow's responses for the 2 feeding systems. Concerning lactation, sows wich were fed with silage during pregnancy had more mobilized their body reserves. A possibility to explain is the weight at the farrowing: "silage sows" were more fatty and could have a lower feeding consumption. **Table 3**.

Table 3 : Performances of 3 ways duroc sows

	Control	Silage	p-value	All
Gestating performance				
N =	21	24		***45***
Mean parity	**1,6**	**1,5**		***1.6***
Mean weight insemination	156.4	188.4	**<0,05**	***173.5***
Mean ELD_insemination	13.4	11.8	**<0,05**	***12.67***
Mean body weight gain	72.22 *(17,6)*	80.15 *(17,5)*	**ns**	***76.45***
Mean ELD gain	3.5 *(3,0)*	4.7 *(4,0)*	**ns**	***4.144***
Mean body weight start maternity	228.6	268.6	**<0,05**	***249.9***
Mean ELD start maternity	15,3	18,1	**<0,05**	***16.81***
Lactating performance				
N =	21	21		
Mean ELD gain	-4.8 *(2,6)*	-6.6 *(2,8)*	**<0,05**	***- 5,7***
Mean body weight gain	-44,0	- 53,6	**<0,05**	***- 48,8***
Piglets live born	10,9	11,4	**ns**	***11,2***
Piglets weaned	10,5	10,6	**ns**	***10,5***

For LW x FL sows, the ranks were higher. Performances were the same with a tendancy of a higher weight gain for silage feeding system. During lactation, the loss of weight were higher than for control. There is a high variability of the responses for sows. **Table 4.**

Table 4 : Zootecnic performances for LW x FL sows

	Control	Silage	p-value	All
Gestating performance				
n =	17	24	-	*41*
Mean parity	4,8	4,5	-	*4,7*
Mean weight insemination	258	242	ns	*249*
Mean ELD_insemination	14.4	13.7	ns	*14*
Mean body weight gain	69.0 *(18.0)*	75.4 *(23.3)*	ns	*72.7*
Mean ELD gain	4,8 *(2.7)*	4,4 *(3.4)*	ns	*4*
Mean body weight start maternity	327.5 *(60.4)*	317.5 *(51.0)*	ns	*321.7*
Mean ELD start maternity	19.2 *(4.1)*	18.1 *(3.8)*	ns	*18.6*
Lactating performance				
n =	16	24		*40*
Mean ELD gain	-3.7 *(2.2)*	-3.5 *(3.1)*	ns	*- 3.6*
Mean body weight gain	-40.1 *(10.6)*	- 51.5 *(18.1)*	<0.5	*- 47.48*
Piglets live born	12.4 *(2.1)*	11.3 *(3.3)*	ns	*11,75*
Piglets weaned	10.1 *(2.7)*	10.0 *(2.4)*	ns	*10.05*

No impact on animal welfare

In the groups observed during gestation, the feeding system didn't impact the aggressive behavior of sows. Silage distribution can compensate the potential negatives effect of a high level of concentrate restriction on animal welfare. The methods to distribute silage were interesting, because that were possible for dominated sows to go to "silage place" and have a lot consumption level of silage.

Economic interest

For a system with 50 sows (like in the experimental farm), the silage feeding strategy allow an economy of 90 kg of concentrate per sow during pregnancy, so 4,5 tonnes for all the sows. That corresponding to 2000 € with the deduction of silage production cost for a farmer who by the concentrate to a mill.