GREEN WILLOW BIOMASS AS FEED SOURCE FOR PIGS

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WILLOW AS LIVESTOCK FEED?

- Valuable ruminant feed supplement E.g. Mahieu et al.. 2021; Vandermeulen et al.. 2018
- High mineral and protein content E.g. Smith et al.. 2014; Luske et al.. 2017; Mahieu et al.. 2021
- Bioactive compounds
  - Analgesics, antipyretics, and anti-inflammatories E.g. Kemp et al., 2003, Lavola et al., 2018; Wang et al. 2018
  - Antimicrobial and antioxidant properties (Bae et al., 2020)
  - Growth of beneficial microorganisms in human faecal microbiota and broiler chicken E.g..Pferschy-Wenzig et al., 2017; Farag et al., 2024.


New growth of willow cut back in February and ready for harvest in June (@A.G Kongsted, AU)


Ensiled green willow biomass pilot tested on pregnant sows, (@A.G Kongsted, AU)


Growing pigs integrated with willow trees (@A.G. Kongsted. AU)

METHODOLOGY
PRODUCTION OF WILLOW FEED

Coppiced (winter)

Regrowth in spring/summer

Directly foraged (growing pigs)

Harvested and ensiled

Fed to gestating sows

Photos: K.V. Riis. S.U. Larsen. A.G. Kongsted, Maria Eskildsen AU

METHODOLOGY
PILOT TEST

- 28 gestating sows
- 2 treatments: **Willow silage** or **whole crop/grass clover silage**
- Start d5 in gestation
- Silage allocation for 78-80 days

Photos: K.V. Riis. S.U. Larsen. A.G. Kongsted. Marendine Lagegaard, ØL

FIRSTFEEDING

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MARIA ESKILDSEN
ASSISTANT PROFESSOR

PRELIMINARY RESULTS CHEMICAL COMPOSITION

	Fresh willow 22/6 - 2022	Fresh whole crop/ grass 22/6 - 2022	Silage of willow 24/4 - 2023	Silage of whole crop/ grass 24/4 - 2023
Dry matter, %	24.6	27.1	23.2	25.5
ME MJ/kg DM*	5.3	6.8	3.0	4.8
Crude protein. % in DM	14.1	10.8	**13.1**	11.5
Lysine. g/kg DM			**9.2**	5.3

** Calculated according to Theil et al.. 2020 (from Johannsen et al. . 2023)*

PRELIMINARY RESULTS
VOLUNTARY INTAKE

	Willow silage (n=16)					Whole crop/ grass silage (n=16)				
	As fed, kg/d	DM, kg/d	ME, MJ/d	CP, g/d	Lysine, g/d	As fed, kg/d	DM, kg/d	ME, MJ/d	CP, g/d	Lysine, g/d
Compound feed	3.0	2.6	40.2	190	6.7	3.0	2.6	24.72	180	6.6
Willow silage	**2.4**	**0.5**	**2.1**	**70**	**5.0**					
Whole crop + grass clover silage						**2.0**	**0.5**	**4.2**	**60**	**2.1**
Carrots	4.31	0.39	3.5	40	0.1	4.72	0.43	3.85	50	0.1
Total	9.54	2.56	30.6	*300*	**11.8**	8.59	2.50	32.78	*300*	**8.8**

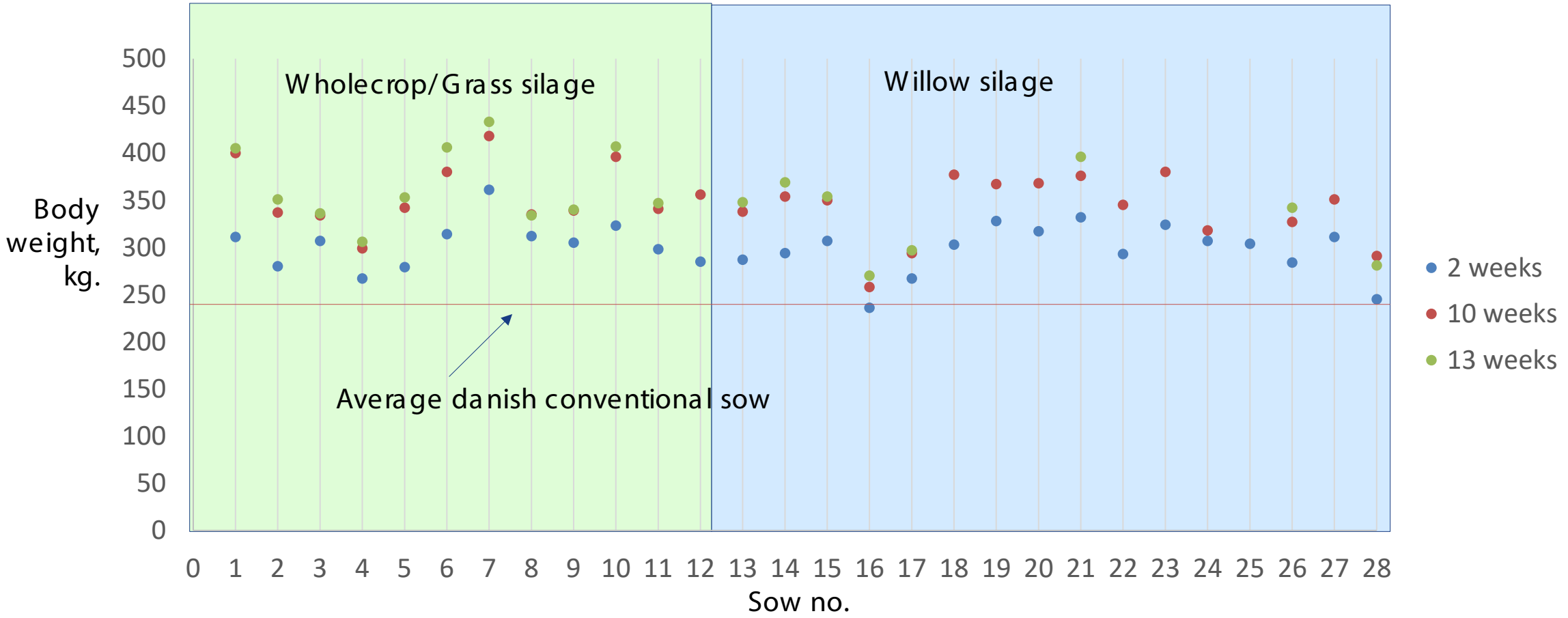
SIDLysinerequirement of pregnant sows: 7.7-11.0 g/d
(ARC 1981; INRA 1989; NRC 1998)

HARVEST PROCEDURE

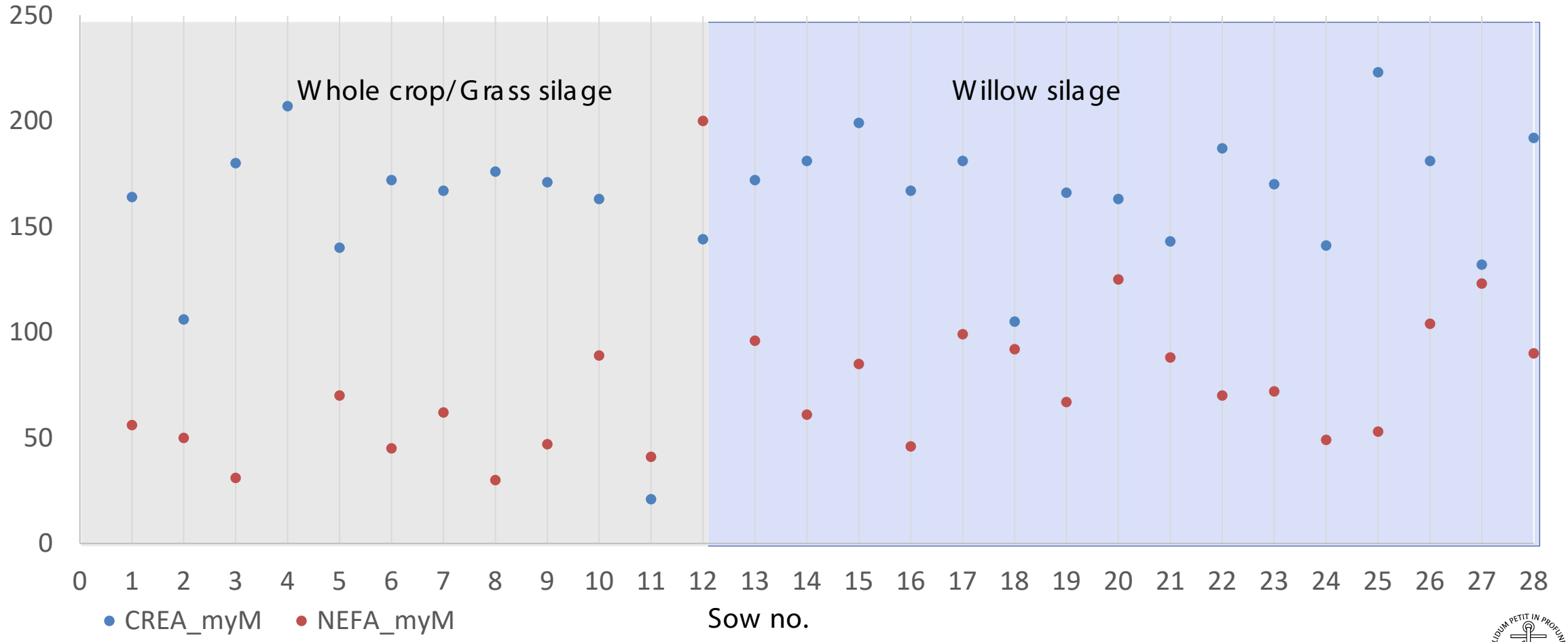
SOW BODY WEIGHT

SOW BODY WEIGHT

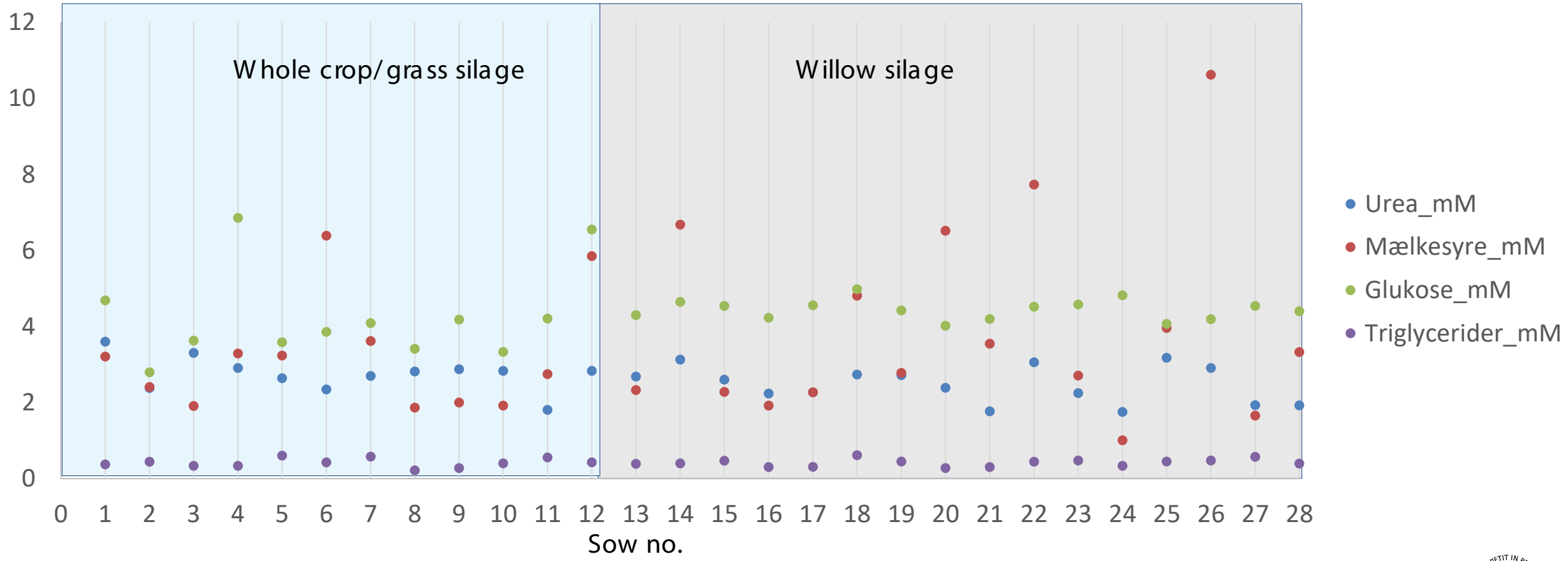
Average gain in gestation:
Whole crop/grass silage: 53 kg
Willow silage: 44 kg



PLASMA


250
200
150
100
50
0
Whole crop/Grass silage
Willow silage
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
CREA_myM
NEFA_myM
Sow no.

PLASMA


Whole crop/grass silage
Willow silage
12
10
8
6
4
2
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
Sow no.
Urea_mM
Mælkesyre_mM
Glukose_mM
Triglycerider_mM

CONCLUSION - WILLOW SILAGE FOR PREGNANT SOWS

- Apparently high palatability (leaves and new sprouts)
- High lysine content
- More studies are needed to validate the nutritional value and voluntary intakes
  - Effects of ensiling on bioactive compounds?
  - Can bioactive compounds be transferred to sow milk, and thereby improve piglet health?

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MIXED
EFFICIENT AND RESILIENT
MIXED FARMING & AGROFORESTRY

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gudp

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Organic RDD

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OUTFIT- project

Fonden for økologisk landbrug

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