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Green biomass from willow as roughage for pigs

AUTHORS:
Line Dinesen Jensen, Anne Grete Kongsted, Maria Eskildsen, and Søren Ugilt Larsen, Aarhus University, DK

AARHUS UNIVERSITY

As a perennial crop, willow has a **high biomass yield**, improves the **soil carbon**, and in general decreases the risk of **leaching** of nutrients compared to annual crops. Furthermore, new shoots and leaves have proven to be well-liked by **pigs**. Willow can be foraged directly by the pigs, harvested and fed fresh, or it can be **ensiled** after harvesting.

Forage crop

Willow can be **foraged directly** by pigs in a free-range system. The pigs will mainly eat the **new shoots** and **leaves**. Therefore, it is necessary to **coppice** the willow to ensure new growth, which is reachable and palatable by the pigs. Furthermore, willow in a free-range pig system will have the potential for both **environmental** and **animal welfare** benefits. Compared to **grass**, which is often easily damaged by the animals, the willow is more **resistant** and can, therefore, lower the risk of **leaching** from nutrient hot spots. Depending on the size of the plants, the willow crop can contribute to animal welfare by providing **shelter**, **shade** and the possibility for **skin care**.

Pigs can forage the willow either in an outdoor paddock system, or as here a combined housing and paddock system.
(Photo: Kristine Vigh Riis)

Fresh cuts or silage

Another way to utilize willow biomass as roughage is to **harvest**, chop and feed **fresh biomass** to the pigs. However, the short durability of freshly cut biomass, and the seasonal variation in nutritional value makes it beneficial to **ensile** the willow biomass to ensure longer availability and better nutritional value. E.g. harvest in early summer will provide a low yield but with high protein content, whereas harvest in late summer will provide high yield but low protein content. It is important to note that a low pH of approximately 4 is in general not achieved without using additives when ensiling biomass of willow. A low pH during ensiling may be ensured by adding formic acid, molasses, lactic acid bacteria or by making a mixed silage of approximately 50:50 willow and grass-clover.

TIPS on green willow biomass

- When ensiling it is important to ensure a **low pH**, either by adding **formic acid**, **molasses** or **lactic acid bacteria** or by mixing with **clover-grass**.
- When harvested early in the summer, willow biomass has relatively **high protein** and **lysine** content compared to grass-clover.
- **Seasonal variation** affects the chemical composition, being most **palatable** to pigs and with the highest **protein content** in **early summer**.

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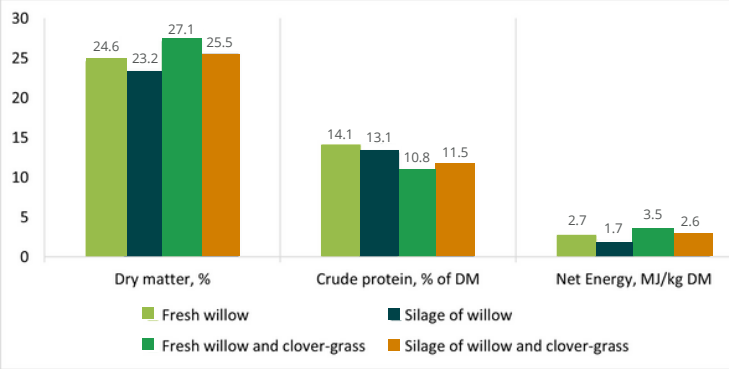
Crude protein and energy content

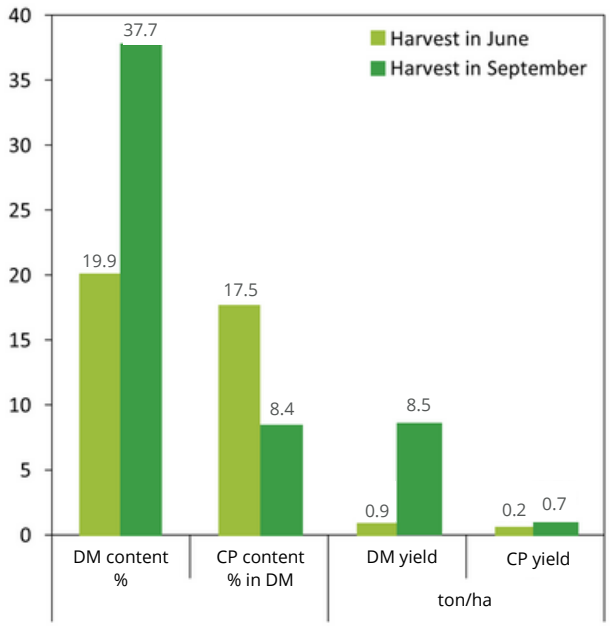


The figure above illustrates the composition of green **willow biomass** and a mixture of willow and **grass-clover** (50:50 ratio), both harvested in **June**. The willow used was clone **Tordis** ((*Salix schwerinii* × *S. viminalis)* × *S. viminalis*). For ensiling of pure willow, **formic acid** was added (78%, 5 kg per ton fresh weight) whereas no additives were used for the mixture of willow and grass-clover (Larsen et al., 2024).

Preliminary results show that gestating sows will eat approximately 2 kg (as fed) of willow silage daily, when provided ad libitum.
(Photo: Søren Ugilt Larsen)

Harvest time

Harvest time of willow affects content and yield of **dry matter (DM)** and **crude protein (CP)**. Here results from harvesting willow as **green biomass** either in **June** or **September** (Larsen et al., 2024).



Harvest of willow for silage production.
(Photo Rikke Thomsen)

Read more details on ensiling willow biomass in Larsen et al., 2024, Ensiling of Willow and Poplar Biomass Is improved by Ensiling Additives