

# Green biomass from willow as roughage for pigs

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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.

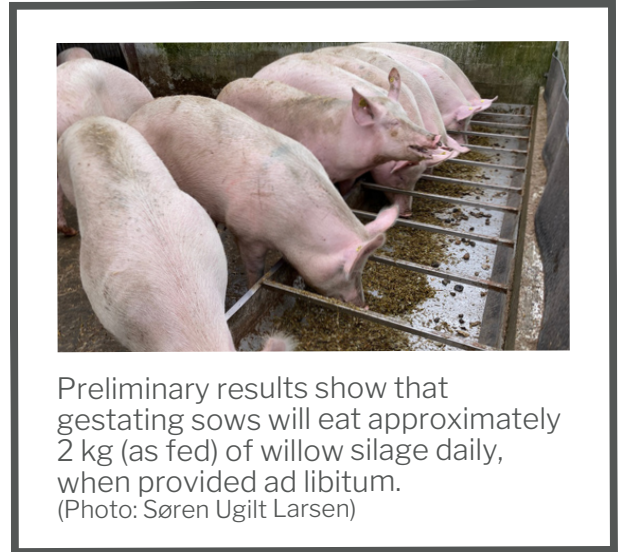
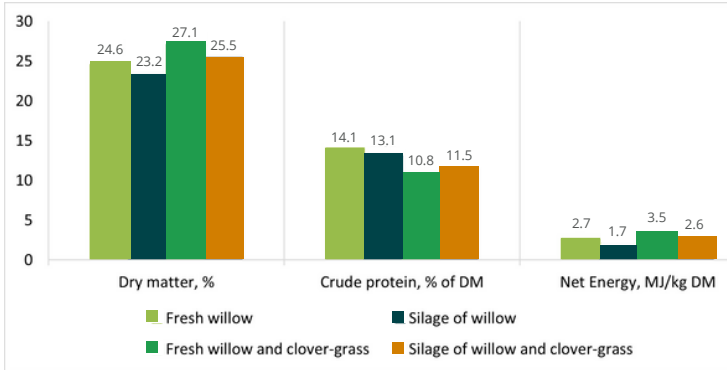
## TIPS

### 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**.



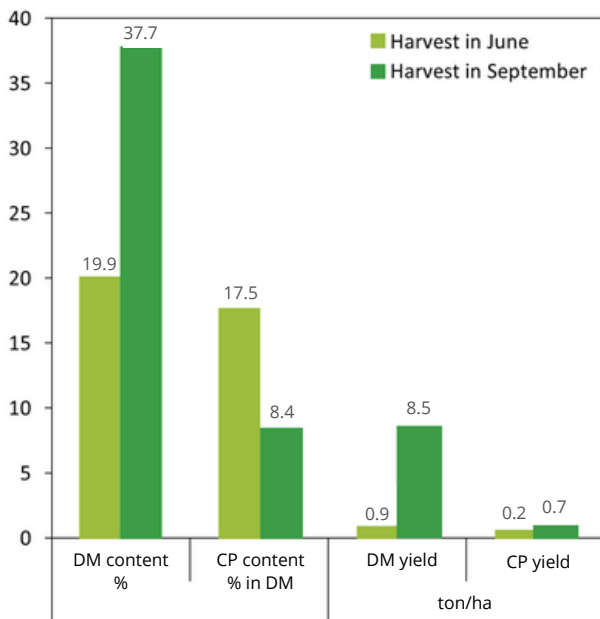
## Crude protein and energy content



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).

## 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).



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