

KERNEL PROCESSING SCORE: DETERMINATION WITH SILAGESNAP¹

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Adjustment of the kernel processor in a Self-Propelled Forage Harvester (SPFH) is critical to high quality feed production. Particle size reduction of the corn kernels contained within chopped and processed corn silage makes the starch more available in the rumen, increasing digestion and in-turn increasing milk production. Increased milk production is the most common train of thought when considering the economic benefit of properly setting a kernel processor, but machinery management and efficiency metrics should be considered as well. Kernel processors utilize a high percentage of the power produced by the engine during corn silage harvest. A substantial amount of material is being forced through a very small gap, causing the power requirements to process the crop to increase substantially. While maintaining the smallest gap possible will produce smaller geometric mean particle sizes of the corn kernels, opening the kernel processor gap just 0.5 mm would reduce the load on the engine. This reduced load would allow the machine to move more quickly through the field or increase the fuel efficiency of harvest. Optimization of the kernel processor gap setting could take move the industry closer to a more efficient harvest.

Harvest timing is also another critical aspect to consider when assessing the economic benefit of kernel processor settings and corn silage harvest. Harvesting the corn silage at the proper moisture content allows for proper ensiling and high quality feed production. Having the moisture of the corn too high or too low yields poor quality feed. Harvest efficiency must be maintained at a high level in order to harvest at the proper moisture over many acres. Staggered planting dates help the crop to hit the right moisture content at different dates, but weather and other factors sometimes negate these windows of opportunity. Moving the forage harvesters through the field as quickly as possible, while maintaining sufficient kernel processing, should be the goal of every silage harvest operation. This provides a high quality feed with sufficient kernel processing that was harvested at the proper moisture content.

Kernel processor setting is also a point of contention between the machine operator and the nutritionist. Machine operators prefer less kernel processing in order to harvest more quickly, while nutritionists prefer more kernel processing to achieve maximum milk yield. A common data collection method for both machine operators and nutritionists to accurately measure corn kernel particle size in the field would be beneficial and hopefully come to common ground about sufficient kernel processing for corn silage.

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Utilizing image processing methods we can accurately estimate kernel processing score quickly. A smart phone application, called SilageSnap, was developed and released in 2018 to help producers and custom operators to estimate kernel processing score during harvest. To use SilageSnap some sample processing is required. Hydrodynamic separation of the kernels from the plant material should be done to assess the kernels by themselves. A coin and a dark matte background is required to accurately assess the corn kernel particle size distribution. Directions for hydrodynamic separation and the use of SilageSnap can be found at:

<https://fyi.uwex.edu/forage/making-sure-your-kernel-processor-is-doing-its-job/>
<https://wimachineryextension.bse.wisc.edu/precision-agriculture/silagesnap/>