Bruks 806ST
equipped with a micro-chip drum

Extended summary of "**Produktion av mikroflis med medelstor trumhugg**", Kunskapsbanken Nr 90-2016.

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FOTO: LARS ELIASSON/SKOGFORSK

Microchips has many uses, today and in the future. It is used as raw material in pelletizing, for co-firing with other fuels in large power and combined heat and powerplants, and is an interesting raw material for chemical processing of woody biomass. However, earlier studies has shown that a reduction of the target chip size reduces chipper productivity and increases fuel consumption.

A trailer mounted Bruks 806ST chipper was studied with a standard and a micro-chip drum to determine the effects on productivity, fuel consumption and chip size distribution by the drum type. The chipper was studied when chipping aspen dominated fuel wood logs. The standard drum has two opposing knifes and an expected chip length of 45 mm. The microchip drum has 4 knifes evenly spread around the drum and an expected chip length of 11 mm.

Before the study wood piles were weighted upon delivery and after the study each pile of chips were sampled to determine moisture content and chip size distribution. On average each pile of wood had a weight of 5.3 metric tonnes and a moisture content of 33 per cent. Time studies as well as measurement of fuel consumption were made during chipping of three wood piles for each drum type. Time studies were made using the same method as in earlier studies of chippers (cf. Lombardini et al. 2013; Eliasson et al. 2014). Fuel consumption has only been measured for the chipper, not the loader feeding it with logs.

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PRODUCTIVITY

Chipper productivity was reduced by 10.5 % when the standard drum was substituted with the micro-chip drum. On average, the chipper produced 32.9 oven dry tonne (odt) per effective chipping hour using the standard drum compared to 29.5 odt using the micro-chip drum.

As the chipper was studied in a test setting in a controlled environment and using small quantities of wood per replication, the productivity can be expected to be a bit high. As a comparison, the productivity with the standard drum in the current study was 9 % higher than the productivity of forwarder mounted 806STC chippers equipped with standard drums studied in commercial chipping operations (Lombardini et al. 2013; Eliasson et al. 2014).

FUEL CONSUMPTION

Chipping using the micro-chip drum increased fuel consumption by 12.5 % per hour and by 23.9 % per produced odt of chips. Using the standard drum, the chipper used 1.41 l of diesel fuel per odt which increased to 1.74 l of diesel fuel per odt when the micro-chip drum was used.

This can be compared to the 1.55-1.6 l per odt consumed by the above mentioned 806STC chippers used in commercial operations.

CHIP SIZE DISTRIBUTION

As expected the micro-chip drum produced finer chips than the standard drum (figure 1), i.e. significantly more chips in the 8-16 mm class. However, the amount of chips in the 16-31.5 mm class was higher than expected. Most of these chips were rather thin but wide pieces, see figure 2. Most of these chips will probably crack during further handling, e.g. loading, thus reducing their size to the 8-16 mm class.

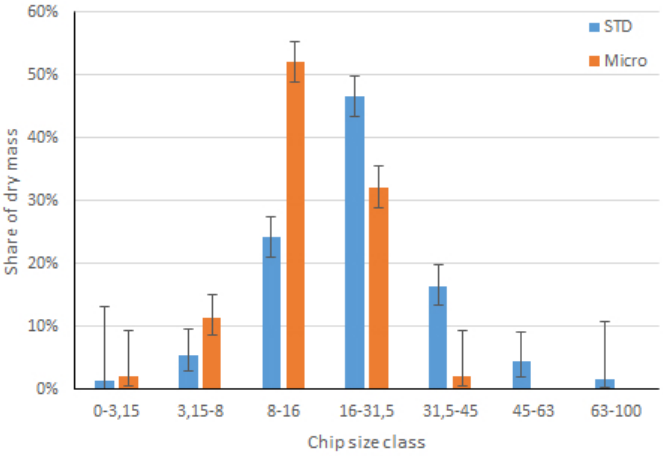

Figure 1. Chip size distribution for the standard (STD) and micro-chip drums. Error bar denotes a 95% confidence interval.

Figure 2. Examples of chips in the 16-32 mm class. Each large square = 10×10 mm, subdivisions 1 mm.

References

Eliasson, L., Granlund, P. and Lundström, H. 2014. Bruks 806 STC – performance and fuel consumption when chipping logging residues of Beech. Skogforsk, Arbetsrapport 833, 7 pp. ISSN 1404-305X. In Swedish with english abstract.

Lombardini, C., Granlund, P. and Eliasson, L. 2013. Performance and fuel consumption of the Bruks 806 STC chipper. Skogforsk, Arbetsrapport 793, 7 pp. ISSN 1404-305X. In Swedish with english abstract.