

EFFECT OF TWO ENSILING SYSTEMS ON EFFICIENCY & SILAGE QUALITY

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INTRODUCTION

- Farmers must ensure they harvest forage at the correct stage of growth for efficient silage production
- Machinery and operator availability are often limited
- The harvesting system can have substantial effects on soil compaction, silage quality and costs
- This study examined the efficiency & nutritive value of silage produced by forage harvester or forage wagon system

MATERIALS AND METHODS

- Fields were split & allocated to one of two harvesting systems:

1. **Forage wagon FW** with Case Optum 270 tractor



2. **Forage harvester FH** with three tractors & trailers transporting



- Grass leys were - mown 20 May
- ensiled 22 May
- Forage treated with *L. plantarum*
- Ensiled in two roofed concrete silos
- Silos filled and rolled by:
 1. **FW** - Fendt Vario 716 & buckrake
 2. **FH** - Case 721G loading shovel
- Fuel consumption & timings recorded
- Bags, filled with FW or FH forage & temperature loggers, buried in corresponding silo
- Chop length determined
- Forage weight and volume determined to calculate density
- Bags recovered after 120 d, silage weighed & analysed

RESULTS

Table 1. Comparison of forage wagon and forage harvester ensiling systems

	FW	FH
No. of harvesters : no. of operators	1 : 2	1 : 5
Total power available (kW)	345	1004
Output (tonnes fresh forage/hour)	19.0	47.8
Fuel (litres / t harvested & ensiled)	1.16	1.68
Silage density at ensiling (kg DM/m ³)	242.5	253.9

- Total power, fuel consumption & output per hour was higher for FH than FW (Table 1)
- Hourly output per operator was similar for both treatments
- Median chop length was <5 cm for FH and 5-10 cm for FW (Fig. 2)
- Silage density was numerically lower for FW compared to FH, possibly due FW having a longer chop length
- FW silage had a higher DM & pH compared to FH silage but no differences in nutritional quality or DM recovery (Table 2)
- Differences in DM & fermentation parameters probably reflect a longer wilting time due to the lower FW ensiling output
- Silage temperature climbed quicker & higher in FH bags (Fig. 1)

Fig. 1. Silage temperature during early ensiling

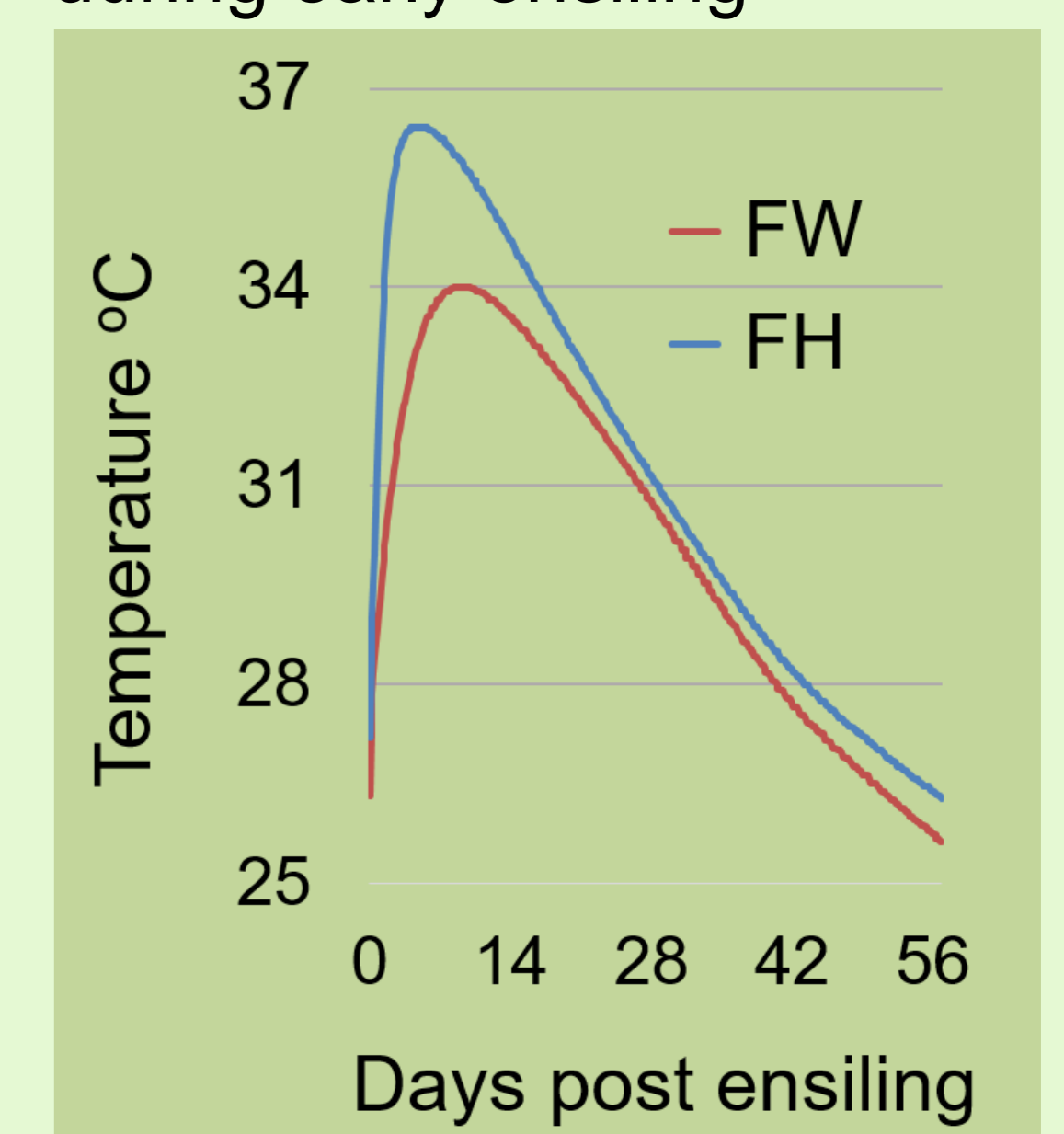


Fig. 2. Forage chop length by weight

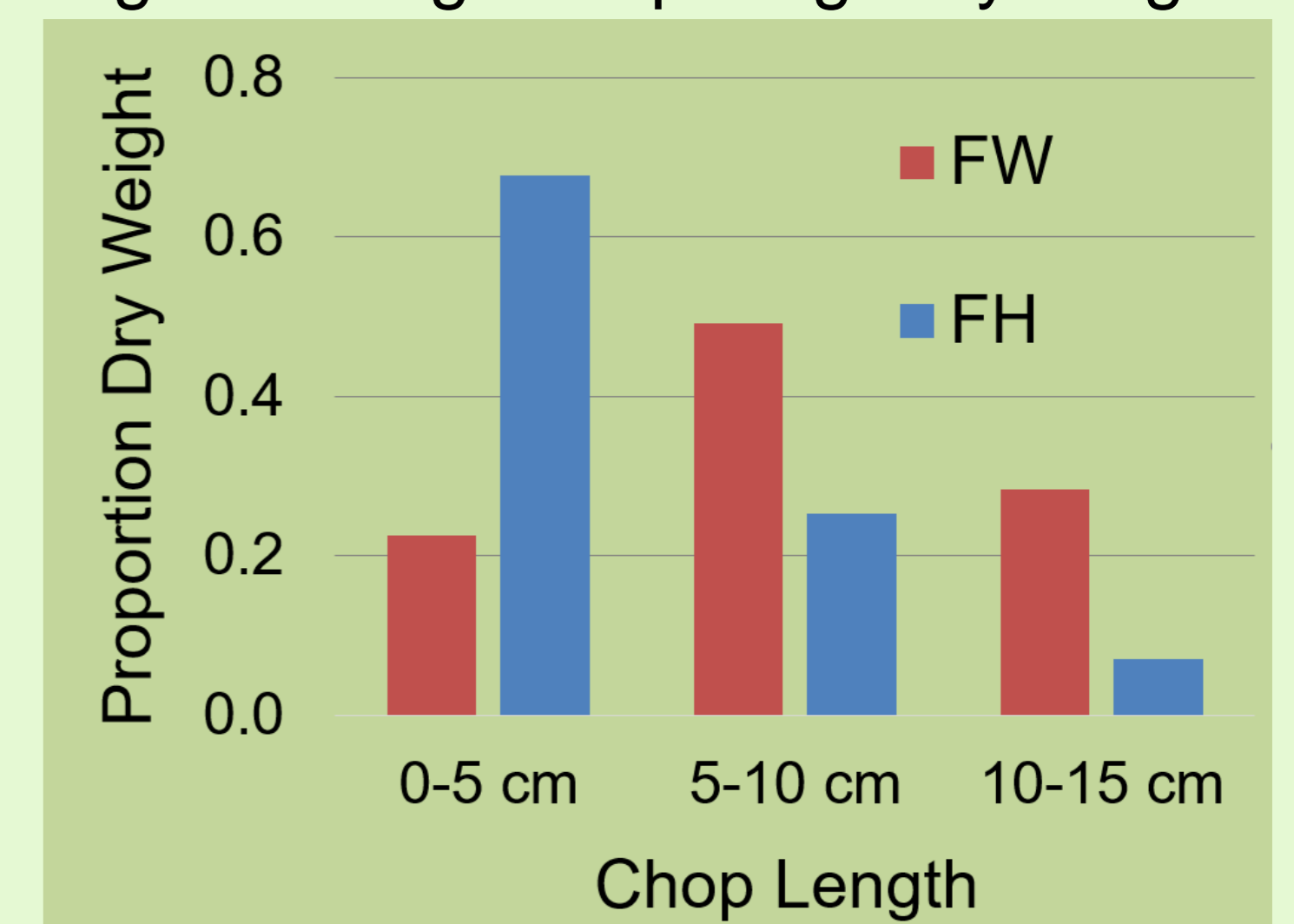


Table 2. Silage chemical analysis and dry matter recovery after 120 days ensiling

	FW	FH	s.e.d.	Prob
DM (g/kg)	456	396	11.9	0.002
Crude Protein (g/kg DM)	140	138	2.8	0.476
DOMD (g/kg DM)	810	822	14.6	0.459
WSC (g/kg DM)	130	142	5.6	0.084
pH	4.26	4.14	0.017	<0.001
NH ₃ (g/kg N)	37.7	42.7	2.76	0.117
Lactic Acid (g/kg DM)	60.6	68.7	4.28	0.107
Acetic Acid (g/kg DM)	2.8	3.6	0.19	0.004
DM recovery %	93.4	91.9	1.36	0.300
Peak temperature (°C)	34.0	36.4	0.25	<0.001
Days to peak	8.1	4.0	0.28	<0.001

CONCLUSIONS

- The forage wagon system had a lower fuel consumption but hourly output per operator did not differ between systems
- Both silages were nutritionally similar but the slower operational rate of the forage wagon system resulted in a higher ensiling DM and reduced silage fermentation rate compared to the forage harvester system

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