



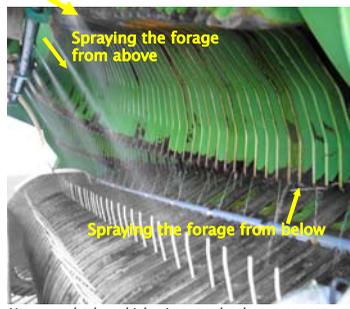
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# Improving the application technique for silage additive in loader wagons and choppers

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Additives (preservatives) generally improve silage quality. But for a good result, the additive has to be dosed with the correct quantity and distributed evenly in the forage. We compared different application methods of additive in loader wagons and precision choppers, regarding evenness of distribution and losses of additive through evaporation and wind drift.



Traditional application only from above

New method, which improved the evenness of application. When the flat fans above were replaced by solid jets, the losses were also reduced.



## Results

### Evenness and loss of additive with different application methods.

Trial 1. CV = coefficient of variation for additive concentration in the loads (the smaller CV the better). Additive: 620 g kg<sup>-1</sup> formic acid, 240 g kg<sup>-1</sup> ammonium formate.

Machine	Application method	Additive		P
		CV, %	loss, %	
Loader wagon	From above, in front of pickup	79.3 <sup>A</sup>	48.3	A versus B; 0.01 < P < 0.05
	From above, at pickup	83.6 <sup>A</sup>	33.9	
	From above + jets under, at pickup	49.7 <sup>B</sup>	32.9	
Precision chopper	From above in inlet channel	46.2 <sup>B</sup>	42.0	

Trial 2. The methods which are most recommendable in each machine are bolded. Additive: 760 g kg<sup>-1</sup> formic acid, 240 g kg<sup>-1</sup> ammonium formate.

Machine	Place of application	Nozzle type	Additive	
			CV, %	loss, %
Precision chopper	1. Pickup	flat-fan nozzles, coarse spray	27.9	16.9
	2. Open inlet channel	flat-fan nozzles, fine spray	31.4	22.4
	3. Open inlet channel	flat-fan nozzles, coarse spray	45.5	7.55
	4. Open inlet channel	perforated pipe; solid jets	29.3	13.5
	5. Covered inlet channel	perforated pipe; solid jets	22.8	9.22
	<b>6. Chute, lower part</b>	<b>solid-jet nozzles</b>	<b>26.0</b>	<b>6.78</b>
	7. Top deflector	solid-jet nozzles	45.5	1.19
Loader wagon	Flat fans from above + solid jets under, at pickup		89.5	47.2
	<b>Solid jets both above and under, at pickup</b>		<b>89.0</b>	<b>28.2</b>

## Conclusions

- The current practice of spraying additive only on top of the ingoing forage in loader wagons results in uneven distribution compared to the evenness achieved in precision choppers.
- Spraying half of the dose of additive from below improves the evenness of distribution in loader wagons.
- From above, narrow jets cause less loss of acid-based additive through evaporation and wind drift than flat fans.
- In tractor-driven precision choppers, the best places of application regarding evenness and losses are the chute and the inlet channel. Application in the chute is technically easier, and can therefore be recommended in practice. Trials with a self-propelled chopper are still going on.
- Smaller losses of additive can be achieved in the precision chopper than in the loader wagon.