# Influences of a Lactic Acid Bacterial Inoculum on Nutritive Value of Corn Silage and the Nutrient Intake of Sheep Fed This Silage

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## Presenter Information

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**Key words :** bacterial inoculum , corn silage , fermentation quality , nutrient intake , nutritive value

**Introduction** It is reported that an appropriate inoculum could improve the fermentation quality of silage (Ranjit *et al* ., 2002 ; Aksu *et al* ., 2004) . This study investigated the effect of inoculum on the nutritive value of corn silage and the nutrient intake of sheep fed this silage .

**Materials and methods** In experiment 1 (2000) , silage made from 1/4milk line corn was prepared in three different treatments : untreated , lactic acid bacterial inoculum 1132 and bacterial inoculum+enzyme , respectively . In experiment 2 (2005) , silage made from 3/4milk line corn was prepared in three different treatments : untreated , lactic acid bacterial inoculum 11C33 and 11C38 , respectively . Sheep were used to determine the nutrient digestibility of corn silages .

**Results** Silages prepared by each method showed high fermentation quality . In experiment 1 , the concentrations of EE , GE , TDN and DE , the digestibility of CP , EE and GE , and the intake of TDN were significantly higher ($p<0.05$) using silage treated with 1132 than in untreated silage . In experiment 2 , the concentration of EE was significantly higher ($p<0.05$) using silage treated with 11C38 than in untreated silage . The digestibility of EE was significantly higher ($p<0.05$) for silage treated with 11C33 or 11C38 than for untreated silage . The intake of TDN with 11C33 or 11C38 treatment did not significantly differ compared to that of untreated silage , TDN intake was increased 20 .6% and 37 .0% , respectively . (Table 1)

**Table 1** *Fermentation quality , chemical composition , digestibility , nutritive value and nutrient intake of silages .*

| | Experiment 1 | | | Experiment 2 | | |
|---|---|---|---|---|---|---|
| | U | 1132 | I+E | U | 11C33 | 11C38 |
| Fermentation quality | | | | | | |
| pH | 3 .88$^{a}$ | 3 .82$^{b}$ | 3 .93$^{a}$ | 3 .77$^{a}$ | 3 .80$^{a}$ | 3 .70$^{b}$ |
| Lactic acid | 4 .59$^{a}$ | 4 .42$^{ab}$ | 3 .93$^{b}$ | 5 .08 | 4 .19 | 4 .36 |
| Acetic acid | 1 .80 | 1 .04 | 1 .58 | 0 .17 | 0 .16 | 0 .17 |
| Butyric acid | 0 .01 | 0 .00 | 0 .02 | 0 .00 | 0 .00 | 0 .00 |
| V-score | 96 .7 | 98 .0$^{a}$ | 92 .5$^{b}$ | 98 .0 | 98 .3 | 98 .3 |
| Chemical composition | | | | | | |
| DM(%FM) | 31 .7$^{b}$ | 34 .6$^{a}$ | 33 .7$^{ab}$ | 30 .9 | 32 .8 | 31 .4 |
| CP(%DM) | 9 .8$^{b}$ | 10 .1$^{ab}$ | 10 .6$^{a}$ | 8 .6$^{b}$ | 8 .9$^{a}$ | 9 .1$^{a}$ |
| EE(%DM) | 3 .3$^{b}$ | 4 .0$^{a}$ | 3 .8$^{ab}$ | 4 .0$^{b}$ | 4 .4$^{ab}$ | 4 .8$^{a}$ |
| GE(Mcal/kgDM) | 4 .28$^{b}$ | 4 .49$^{a}$ | 4 .42$^{a}$ | 4 .44 | 4 .51 | 4 .49 |
| Digestibility | | | | | | |
| DM(%) | 65 .9 | 71 .8 | 69 .2 | 62 .7 | 66 .0 | 66 .6 |
| CP(%) | 40 .0$^{b}$ | 53 .1$^{a}$ | 55 .8$^{a}$ | 38 .9 | 43 .5 | 47 .3 |
| EE(%) | 69 .3$^{b}$ | 80 .8$^{a}$ | 84 .1$^{a}$ | 78 .0$^{b}$ | 84 .6$^{a}$ | 84 .9$^{a}$ |
| GE(%) | 65 .5$^{b}$ | 73 .1$^{a}$ | 70 .6$^{ab}$ | 63 .9 | 67 .1 | 68 .1 |
| Nutritive value and intake | | | | | | |
| TDN(%DM) | 65 .1$^{b}$ | 73 .6$^{a}$ | 70 .9$^{ab}$ | 63 .8 | 67 .9 | 69 .3 |
| DE(Mcal/kgDM) | 2 .81$^{b}$ | 3 .28$^{a}$ | 3 .12$^{a}$ | 2 .84 | 3 .03 | 3 .06 |
| DM(g/kg$^{0.75}$/day) | 34 .9 | 40 .9 | 40 .8 | 29 .6 | 33 .6 | 37 .3 |
| TDN(g/kg$^{0.75}$/day) | 23 .0$^{b}$ | 30 .2$^{a}$ | 29 .1$^{a}$ | 18 .9 | 22 .8 | 25 .9 |

U , untreated . EE , ether extracts . GE , gross energy . ab , $p<0.05$ .

**Conclusions** Lactic acid bacterial inoculum can improve the nutritive value and the nutrient intake of sheep fed this silage . The improvement was induced by the lactic acid bacterial flora and the growth stage of the corn .

**References**

Ranjit , N .K . , Taylor , C .C . , Kung , J .L . (2002) . Effect of *Lactobacillus buchneri* 40788 on the fermentation , aerobic stability and nutritive value of maize silage . *Grass and Forage Science* 57 , 73-81 .

Aksu , T . , Baytok , E . , Bolat , D . (2004) . Effects of a bacterial silage inoculum on corn silage fermentation and nutrient digestibility . *Small Ruminant Research* 55 , 249-252 .