

## **Effects of kernel processing at harvest and nutrition strategy in diets containing unprocessed whole plant corn silage in dairy cows performance**

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### **Introduction**

Whole plant corn silage (WPCS) is the forage most widely used in Brazil (Bernardes and Rêgo, 2014) and worldwide (Ferraretto et al., 2018) for lactating cows. This roughage is characterized by being a rich feed due to the physically effective NDF (from the vegetative fraction) and high energy supply (mainly from the starch present in the grain) (Ferraretto et al., 2018). Approximately 72% of the dry matter of the grain fraction is starch (Huntington, 1997) with total-tract starch digestibility from 80 to 98%, represents about half of the energy in WPCS. The kernel processing at harvest becomes crucial, improving enzymatic and microorganism action and increasing starch utilization efficiency. In addition to affecting rumen microbial protein synthesis, energy flow to the animal, milk and solids yield. The objective of this study was to evaluate pull-type forage harvester with kernel processor and nutrition correction strategy with greater addition of dry ground corn in diets containing unprocessed in the performance of dairy cows.

### **Material and methods**

Twenty-one Holstein cows, in an open walled sand bedded free-stall with fans and equipped with feed monitoring system, were randomly allocated in a sequence of three treatments, in a 3x3 Latin Square design, conducted simultaneously, with periods of 18 days and responses to the treatments measured of the 13<sup>o</sup> to 18<sup>o</sup> day. The treatments consisted of silage harvester of pull-type forage harvester with kernel processor (KP), pull-type forage harvester (C) and pull-type forage harvester with addition of 0.5 kg of dry ground corn per day for each animal (C+S). Data were analyzed by the SAS MIXED procedure, with values  $\leq 0.05$  considered significant and below  $\leq 0.10$  as trend.

### **Results and discussion**

Milk yield was similar in C + S and KP treatments (26.7 kg/cow/day) and lower in C (25.9 kg/cow/day) and DMI gain of 1.2 kg/day in KP treatment in relation to C. Bal et al., (2000) reported a 1.2 kg and increase in milk yield followed by a higher DMI (+ 0.6 kg) for cows fed processed WPCS. Mean MUN concentrations of herds were negatively correlated with dietary non-fibrous carbohydrate (NFC) levels (Godden et al., 2001). Lower MUN values (11.6 mg/dL)

were observed in C + S, which may be related to increased rumen starch digestibility (Ferraretto and Shaver, 2012) and improved use of rumen nitrogen (NRC, 2001).

**Table.** Effect of corn silage processing on the performance of dairy cows

| Item                         | <sup>1</sup> C | <sup>1</sup> C+S | <sup>1</sup> KP | SEM    | <sup>2</sup> P C <sub>1</sub> | <sup>2</sup> P C <sub>2</sub> |
|------------------------------|----------------|------------------|-----------------|--------|-------------------------------|-------------------------------|
| DMI. kg/d                    | 20.5           | 21.9             | 21.7            | 0.82   | 0.06                          | 0.67                          |
| Milk. kg/d                   | 25.9           | 26.7             | 26.7            | 1.34   | 0.07                          | 0.99                          |
| 3.5% FCM <sup>3</sup> . kg/d | 25.7           | 26.3             | 26.1            | 1.39   | 0.61                          | 0.73                          |
| Fat. kg/d                    | 0.894          | 0.912            | 0.896           | 0.0543 | 0.97                          | 0.72                          |
| Fat. %                       | 3.46           | 3.47             | 3.47            | 0.002  | 0.93                          | 0.98                          |
| Protein. kg/d                | 0.793          | 0.790            | 0.788           | 0.0346 | 0.74                          | 0.88                          |
| Protein. %                   | 3.07           | 3.00             | 3.06            | 0.001  | 0.89                          | 0.11                          |
| Lactose. kg/d                | 1.161          | 1.169            | 1.153           | 0.0744 | 0.78                          | 0.57                          |
| Lactose. %                   | 4.47           | 4.43             | 4.45            | 0.001  | 0.69                          | 0.69                          |
| Solids. kg/d                 | 3.090          | 3.120            | 3.084           | 0.1657 | 0.94                          | 0.62                          |
| Solids. %                    | 11.91          | 11.85            | 11.95           | 0.002  | 0.87                          | 0.61                          |
| Casein. %                    | 2.40           | 2.36             | 2.40            | 0.001  | 0.86                          | 0.26                          |
| Casein. % protein            | 0.784          | 0.787            | 0.784           | 0.0072 | 1.00                          | 0.22                          |
| MUN. mg/dL                   | 13.2           | 11.6             | 12.9            | 0.72   | 0.64                          | 0.06                          |
| Milk/DMI. kg/kg              | 1.28           | 1.23             | 1.25            | 0.043  | 0.57                          | 0.60                          |
| 3.5%FCM/DMI.kg/kg            | 1.26           | 1.21             | 1.23            | 0.047  | 0.47                          | 0.81                          |

<sup>1</sup>Treatments were KP = pull-type forage harvester kernel processor, C= pull-type forage harvester and C+S = pull-type forage harvester more dry ground corn.

<sup>2</sup>Orthogonal contrasts includes C<sub>1</sub> - KP vs. C and C<sub>2</sub> - KP vs. C+S.

<sup>3</sup>3.5% Fat corrected milk was calculated as followed equation: (0.4324 x kg Milk)+(16.216 x kg fat) (Tyrrell and Reid, 1965).

## Conclusion

Adding half a kilogram of ground dry corn in diet containing unprocessed WPCS showed similar result in milk production to diet processed WPCS. Also, it was observed animal performance gains in milk yield and ingestion dry matter (DMI) when we compare process WPCS to unprocessed WPCS.