



Development of Feedstuff to Use Grinded Silage of Whole Crop Barley and Wheat

Tae-Hwa Song, Jong-Ho Park, Jong-Chul Park, Chon-Sik Kang, Jae-Han Son, Young-Mi Yoon, Yang-Kil Kim, Young-Keun Cheong, Kyong-Ho Kim, Bo-Kyeong Kim and Tae-II Park *

Department of Crop Breeding Division, National Institute of Crop Science, RDA, Iseo-myeon, 55365, Korea

Objectives

To investigate the optimal harvesting time, feed values and fermentation quality of barley and wheat for the making of grinded whole crop silage and evaluation of feeding effect in growing pigs.

Materials & Methods

- Materials : Barley(Seassal), Wheat(Keumkang), Growing pigs ((Landrace x Yorkshire) x Duroc)
- Methods
 - Harvest time: Barley (Day after heading 30, 35, 40) Wheat (Day after heading 35, 40, 45)
 - Investigating items: Moisture content, Growth characteristics, Yield
 - Analysis items : Feed value, pH, Organic acid, Blood composition

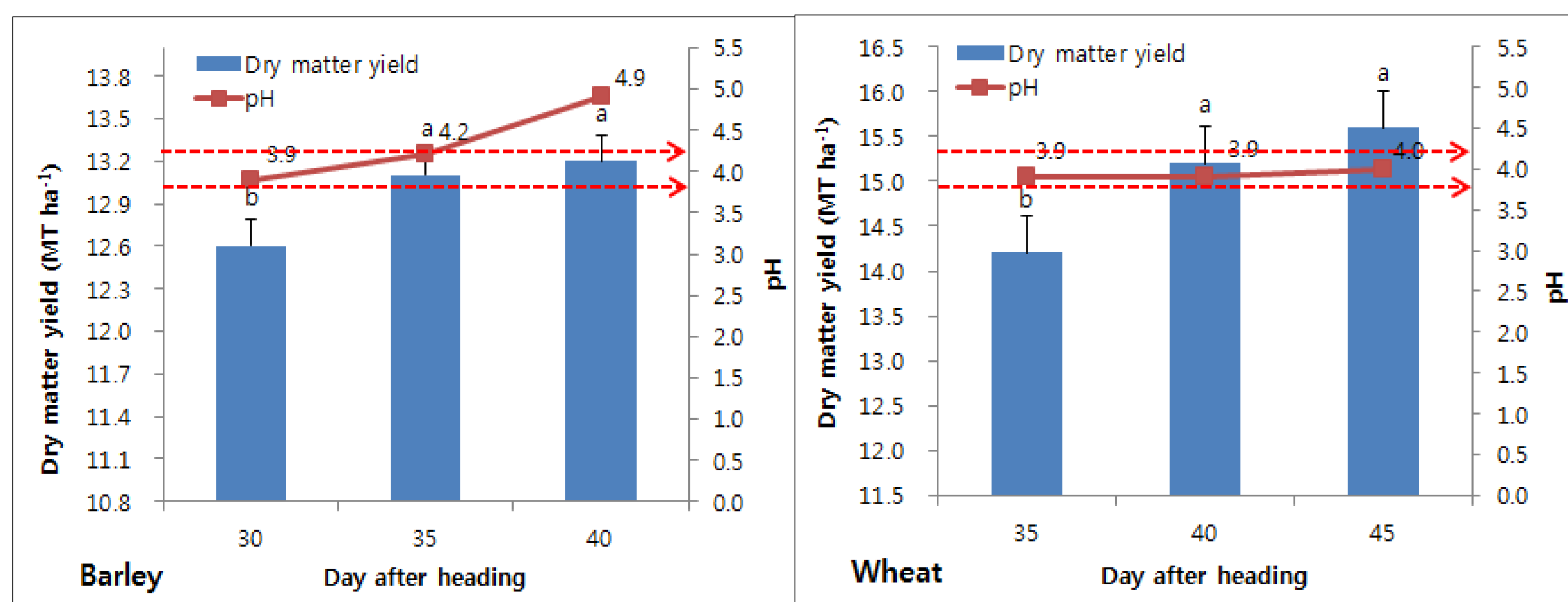


Fig. 1. Dry matter yield and pH of grinded whole crop silage.

Table 2. Change of pH and organic acid contents of grinded whole crop silage of winter cereals according to different harvesting times.

Species	Harvesting time (Day after heading)	pH	Organic acid (% DM)		
			Lactic	Acetic	Butyric
Barley (Seassal)	30	3.9	6.79 ^a	0.36	-
	35	4.2	4.38 ^b	0.30	0.01
	40	4.9	1.73 ^c	0.12	-
Mean		4.3	4.30	0.26	0.01
Wheat (Keumkang)	35	3.9	8.29 ^a	0.43	0.04
	40	3.9	7.03 ^b	0.68	0.07
	45	4.0	5.65 ^b	0.22	0.08
Mean		3.9	6.99	0.44	0.06

^{a-c}Means in a row with different letters are significantly different(P<0.05)

Results

Table 1. Growth characteristics and yield of barley and wheat for whole crop silage at different harvesting times.

Species	Harvesting time (Day after heading)	Plant height (cm)	Number of spikes (No/m ²)	Yield (MT ha ⁻¹)		
				Fresh	Dry Matter	TDN
Barley (Seassal)	30	88	811	30.8	12.6 ^b	8.8 ^b
	35	89	764	24.9	13.1 ^a	9.5 ^a
	40	92	742	17.3	13.2 ^a	9.5 ^a
Mean	-	90	772	24.3	13.0	9.3
Wheat (Keumkang)	35	84	830	35.1	14.5 ^b	10.0 ^b
	40	85	817	27.2	15.2 ^a	10.5 ^a
	45	85	778	25.5	15.6 ^a	10.6 ^a
Mean	-	85	808	29.3	15.1	10.4

^{a-c}Means in a row with different letters are significantly different(p<0.05)

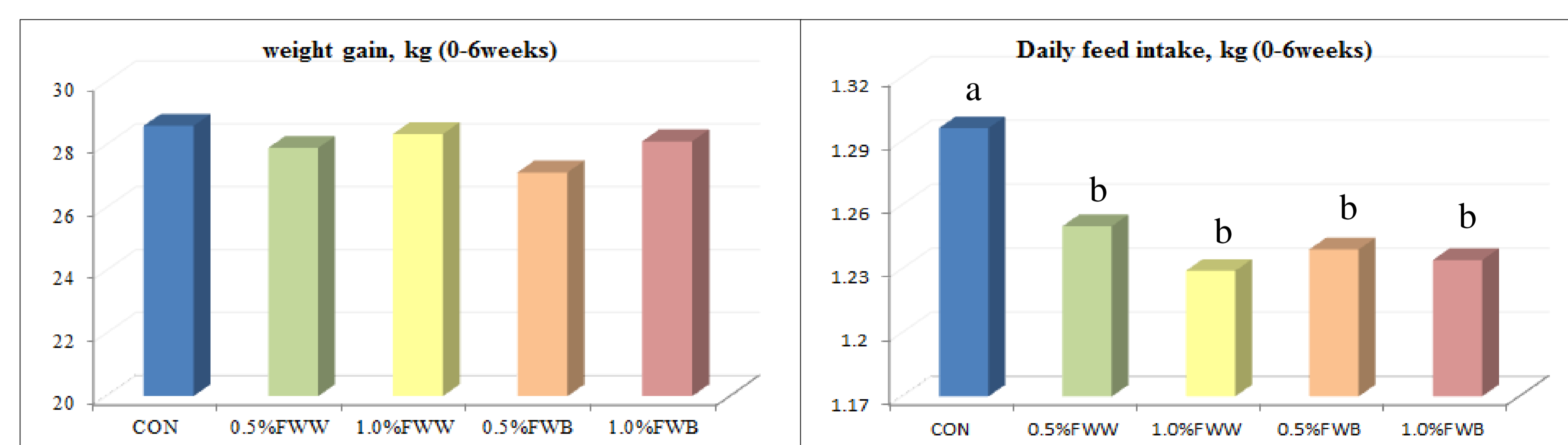


Fig. 2. Growth performance in growing pigs.

Table 3. Effect of fermented whole crop wheat and barley diets on blood profile in growing pigs.

Items	CON	FWW		FWB		SE
		0.5	1.0	0.5	1.0	
Total cholesterol (ml/dl)	104.50 ^a	98.75 ^{ab}	94.75 ^{ab}	95.00 ^{ab}	87.00 ^b	4.21
HDL cholesterol (ml/dl)	31.50	30.75	34.75	31.50	32.75	5.22
LO cholesterol (ml/dl)	58.00	57.35	54.85 ^c	56.15	58.35	4.21
Triglycerides (ml/dl)	40.00 ^a	33.25 ^b	30.75	31.75 ^c	34.50 ^b	1.02
BUN (mg/dl)	22.98	18.68	23.73	21.75	23.88	1.38
Cortisol (ug/dl)	3.53 ^a	2.48 ^{bc}	1.10 ^c	2.90 ^{ab}	2.53 ^{bc}	0.38

CON: basal diet; 0.5% FWW: control diet + 0.5% fermented whole crop wheat; 1.0% FWW: control diet + 1.0% fermented whole crop wheat; 0.5% FWB: control diet + 0.5% fermented whole crop barley; 1.0% FWB: control diet + 1.0% fermented whole crop barley. a, b, c Means in the same row with different superscripts differ (P < 0.05) SE: standard error

As a result, moisture contents of barley and wheat for grinded silages decreased more at late harvest, whereas dry matter yield and TDN yield increased at prolonged period after heading and showed significant at p<0.05. Fermentations resulted in increasing the pH value at the late harvesting time, and decreasing the lactic acid content (p<0.05). Consequently, considering the quantity and quality of fermentation of barley and wheat, these can be used as whole crop silages when they were grinded at 35 days and 40 days after heading, respectively. The result of the growth performance in pigs, weight gain was no significant difference, and the daily feed intake of control treatment was higher than other treatments. In terms of the total cholesterol in blood, the 1.0% FWB treatment was lowest, and there were no significant differences among the other four treatments. Pigs fed the diets with FWW, 1.0% FWB treatments had significantly reduced triglyceride and cortisol levels, and 1.0% FWW treatment was the lowest. There were no significant differences in HDL cholesterol, LDL cholesterol and BUN among treatments.