Intake of corn stover plant parts by feedlot beef steers

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Introduction

- Corn stover can support feedlot operations in intensive corn producing regions of the U.S.
- A single-pass corn grain and stover harvest system was developed to increase efficiency of field operations
- Single-pass stover harvest is a method whereby combine harvester tailings consisting of cob, stalk, leaf, husk and tassel fractions are collected and baled without coming into contact with soil

Approach

- Fed beef steers diets that included a roughage component consisting of harvested corn residue in chopped form from conventional corn stover bales (CST) or single-pass bales (SPB)
- Fed during steer growing and finishing phases to assess the consumption of corn plant botanical fractions and calculate a net energy value of the stovers

Materials and Methods

- 3 roughage trtmts x 5 pens/trtmt; 6 crossbred steers per pen; same allocation for both trials
- Grow: 20% diet DM as corn silage, CST or SPB; diet aNDF: 32.4, 40.9, 40.2%, respectively
- Finish: 15% diet DM as corn silage, CST or SPB; diet aNDF: 20.3, 25.3, 25.5%, respectively
- Hand separated stover offered and orts into cob, stalk, leaf/husk (LH), and fines (particles <8 mm)

Results

Table 1. Animal performance in Grow and Finish Trials

Grow Trial (84 d)	Corn Silage	CST	SPB	SEM	*P*-value
Initial, kg steer^{-1}	402^{ab}	398^{b}	404^{a}	1.9	0.03
Final, kg steer^{-1}	509^{a}	489^{b}	500^{a}	4.0	<0.01
Gain, kg steer^{-1} d^{-1}	1.27^{a}	1.08^{b}	1.14^{b}	0.05	0.02
DMI, kg steer^{-1} d^{-1}	9.97^{a}	9.82^{a}	9.63^{b}	0.08	<0.01
Gain/DMI	0.128^{a}	0.111^{b}	0.119^{ab}	0.005	0.04
Finish Trial (83 d, 69 d, 47 d)					
Initial, kg steer^{-1}	547^{a}	531^{b}	543^{ab}	5.58	0.05
Final, kg steer^{-1}	660	651	661	7.46	0.37
Gain, kg steer^{-1} d^{-1}	1.69	1.79	1.78	0.06	0.12
DMI, kg steer^{-1} d^{-1}	10.8^{b}	12.7^{a}	12.6^{a}	0.31	<0.01
Gain/DMI	0.155^{a}	0.141^{b}	0.142^{b}	0.004	0.02

^{a,b}Means in a row without common superscripts differ at $P \leq 0.05$.

Table 2. Net intake and net energy values of corn stover fractions in Finish Trial

	CST			SPB		
Fraction ID	Net Intake	NEm	NEg	Net Intake	NEm	NEg
	DM basis	Mcal/kg		DM basis	Mcal/kg	
Cob	0.11	1.03	0.48	0.36	1.06	0.51
Stalk	0.40	0.82	0.28	0.12	0.53	0.04
LH	0.45	1.04	0.49	0.44	1.01	0.46
Fines	0.04	0.98	0.43	0.07	0.99	0.44
Total[3]	1.00	0.95	0.40	0.99	0.96	0.42

Table 3. Finish trial diet net energy values calculated from animal performance[1] or from feed analysis[2]

	paNEm[1]	paNEg[1]	NEm[2]	NEg[2]
Treatment Diet	Mcal/kg DM			
Corn Silage	2.14	1.47	2.11	1.44
Conventional Corn Stover	1.89	1.25	1.94	1.28
Single Pass Bale	1.90	1.26	1.94	1.28

Conclusions

- Cob net intake reflected cob proportion in stover offered; SPB cob caused physical fill limitation of DMI in Grow trial
- Cob fraction of SPB stover intake was 0.37 for Grow and 0.36 for Finish trial
- CST and SPB, substituted for corn silage, increased DMI and decreased G:F in Finish trial
- Agreement between performance-adjusted and ingredient composition-based net energy values

[1] Performance-adjusted NEm and NEg values (Owens and Hicks, 2019) were calculated as described in Zinn and Shen (2003).

[2] Ingredient NEm and NEg values were based on composition analyses and then calculated using the method described in NRC (2001).