

Name \_\_\_\_\_ School \_\_\_\_\_ Contestant Number \_\_\_\_\_

**2015 Cowboy Classic - Agricultural Technology and Mechanical Systems  
Environmental and Natural Resources**

You have recently been hired by the J. R. Simplot Feedlot in Torrington, Wyoming to study rate of methane release based upon different feedstuffs in livestock. In your research you have found that cattle consuming forages convert about 7.9% of energy into methane, but when they consume concentrates, the conversion rate decreases with only 2.1% of energy being converted to methane. **Referencing the resources provided to you determine the following:**

**Fill out the following table for Net Energy on a gain basis.**

<b>Feedstuffs</b>	<b>(As Fed) NE<sub>GAIN</sub></b>	<b>(Dry) NE<sub>GAIN</sub></b>
Native Plants, Intermountain, Hay	.10 Mcal/kg	.11 Mcal/kg
Corn Ear Silage	.45 Mcal/kg	1.03 Mcal/kg
Fresh Brome Grass Forage	.28 Mcal/kg	.95 Mcal/kg
Soybean Seeds	2.29 Mcal/kg	2.52 Mcal/kg

**Based on the information that you have determined from the table above please complete the following questions. Use the back of the page to do the calculations. Please round your answers to two decimal places.**

<b>Equations</b>
(kgs of feed) x (Mcal of feedstuff) = Mcal in feed
(Mcal in feed) x (percentage converted) = kg of methane produced

- How much methane would a steer consuming 2.27 kg of native plants, on a dry matter basis, be producing?  $2.27\text{kg} \times .11 \text{ Mcal/kg} = .25 \text{ Mcal} \times .079 = .02 \text{ kg of Methane}$
- How much methane would a steer consuming 2.27 kg of brome grass hay, on a dry matter basis, be consuming?  $2.27 \text{ kg} \times .95 \text{ Mcal/ kg} = 2.16 \text{ Mcal} \times .079 = .17 \text{ kg of Methane}$
- Of the two roughages mentioned above, which produces less methane when consumed by a steer?  
**native plants produces less methane when feed to a steer**
- How much methane would a steer consuming 11.34 kg of corn ear silage, on a dry matter basis, be producing?  $11.34 \text{ kg} \times 1.03 \text{ Mcal} = 11.68 \text{ M cal} \times .021 = .25$
- How much methane would a steer consuming 11.34 kg of soybean hulls, on a dry matter basis, be producing?  $11.34 \text{ kg} \times 2.52 \text{ Mcal} = 28.58 \text{ Mcal} \times .021 = .60$
- Of the two concentrates mentioned above which produces less methane when consumed by a steer?  
**Corn ear silage produces less methane when fed to a steer.**

<b>Criterion</b>	<b>Points Possible</b>	<b>Points Earned</b>
Questions	28 (2 pts. ea.)	
Safety	2	