Can yak meat find a place on the menu?

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Farm diversity is a tool that can aid in managing production and financial risks for small farms. Ruminant animals are capable of converting human inedible biomass into quality protein. Land too steep to row crop for fear of soil erosion is a resource best utilized for forages and grazing. In the eastern United States, the foothills of the Appalachian Mountains are best suited for grazing systems for ruminant animals. Beef cattle have long grazed the meadows of the Ohio river valley as settlers moved west. Small ruminants are a challenge due to higher precipitation leading to increased exposure to internal parasites and bacterial induced foot infections. *Bos grunniens* or the domesticated yak has the potential to be a species to diversify small farms in the region. They were imported to North America in the late 1800's and early 1900's. Early agricultural research studies investigated their potential to develop yakxbeef hybrid to aid in settling the harsh Canadian and Alaskan environments. Yaks have since spread across the United States from Oregon to Maine and Wyoming to Texas. This wide range of existence illustrates their adaptability. Little research has been conducted with the domesticated yak as a farm animal. Yaks can provide renewable fiber with a quality similar to cashmere. Yaks produce meat that is as lean or leaner than bison while being easier to raise and manage being a domesticated animal. More information is needed on the potential of yaks to aid in diversifying small farms in a forage-based production system. The objective of this small study was to assess the potential of yak meat to be a restaurant menu item.

The study was approved for exemption by the University of Kentucky Institutional Review Board (#76140). Three cuts of yak meat, ground, should roast, and ribeye steak, were provided to chefs to prepare as they desired. USDA inspected yak meat was sourced from a single farm that harvested intact male yaks which were three years of age or greater. Yaks were offered a forage only diet grazing a mixed species cool-season perennial pasture or cool-season hay during the winter months. A feedback tool was utilized to collect basic sensory information and other information related to adding yak meat to a menu. A Likert scale of 0-100 was utilized to gather feedback on how much they enjoyed the dish which was prepared from the yak meat cuts. A similar scale was used to collect feedback on the juiciness, tenderness, intensity of flavor, and overall flavor of yak meat. Chefs were asked to provide general feedback related to any off-flavors noted. Questions were asked if chefs would add yak meat to a menu, attributes considered to add yak meat to a menu and the price they would expect to pay for the various cuts. A total of eight responses were collected. Responses were summarized with the mean, minimum and maximum values reported.

A variety of entrees were prepared by the chefs. Ground yak meat was used to prepare burgers, stuffed ravioli, taco meat, and meatballs. Roast cuts were prepared in a variety of ways including: stew, New England-style pot roast, roast with blueberry wine and bacon, pot roast with carrots and cipollini onions, Posele stew, and braised with red wine then allowed to simmer. Steaks were prepared as expected being either seared at very high temperatures or sous vide and then seared. The entrees prepared by chefs showcased a diversity of dishes in which the cuts could be used in restaurants. The roast and ground entrees were very similar in ranking and numerically higher than the ribeye steak for

overall eating enjoyment of the dish (Table 1). Overall flavor of the yak meat was reported to be similar for the cuts ranging between 73.6 to 79. Flavor feedback was mostly positive and included comments such as slight flavor of lamb, game flavor, venison, very mild, and no off-flavor were reported by participants. Participants were asked to describe any off-flavors they noted. Additional comments included: earthy, grass, very lean, fat had intense gamey flavor, and very good having less intensity than venison.

Basic sensory feedback was neutral to positive for the yak meat and are reported in Table 2. The mean ratings for toughness of the roast and steak were 62.0 and 58.3, respectively. A wide range was noted for toughness from as low as 20 to 97 indicating some found the meat tough to very tender. This large degree of variability may be due to preparation, cut of meat or individual perception of toughness. Ratings for juiciness were slightly greater than toughness for the roast and steak cuts. Flavor intensity was numerically greater for the ground than the steak and roast. This may be due to a slightly higher fat content of the ground product than the other cuts.

Participants were asked if they would add yak meat to their menus. The majority (5 of 8 or 62.5%) responded maybe while two individuals indicated “yes” and only one person indicated “no”. The individual that responded with “no” was not due to the meat characteristics. They operated a seafood restaurant and yak would not fit the theme. The response was not due to the characteristics of the meat. One chef that responded with “yes” had already added yak to their menu. The attributes chefs considered important for the addition to a menu (Table 1) receiving the greatest frequency of responses included: locally sourced, price, availability and taste/flavor. Grassfed and natural were important attributes for 50% of the participants while organic and grainfed were minor factors being reported.

Price point is a key part of building a marketing plan and enterprise budget. Participants were asked to indicate the price they would expect to pay per pound on a scale of $0 to $40 per pound for each cut. As expected, the price chefs expected to pay was the lowest for ground yak meat averaging $7.30. The average price chefs expected to pay for roast was $12.50 while the steak average price was $16 per pound. This follows the same trend observed for pricing of beef cuts. Chef responses may be biased as a result of the pricing system of other meat products such as beef.

Yak meat is an acceptable lean red meat option for restaurants and has begun to find its way onto the menu. Animals are processed similarly to beef allowing the preparation of a wide range of entrees. The sensory feedback from chefs was neutral to positive with no issues of off-flavors that would negatively impact eating experiences. Based on feedback, steaks are the most challenging with respect to toughness and consistency in eating experience. Alterations in managing the middle meat cuts such as extended dry or wet aging may be needed to increase tenderness. Processing animals at a younger age may also be an option if the demand for middle meats and profit margin improves to offset the lower meat yield from a younger, lighter animal.

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Table 1. Chef responses for how much they enjoyed the entrees they prepared with the yak meat cuts and overall flavor of the yak meat (0=Extremely Disliked & 100=Liked Immensely).

Meat Cut Entrée (n=8)	Mean	Min	Max
roast	75.9	46	100
steak	64.0	60	100
ground	76.9	50	100
Overall flavor			
roast	77.0	45	100
steak	79.0	54	100
ground	73.6	46	100

Table 2. Chef responses for the overall Tenderness, Juiciness and Intensity of the flavor of the yak meat cuts (0=Very Tough, Very Dry, Extremely Bland and 100=Very Tender, Very Juicy or Extremely Intense).

Tenderness (n=8)	Mean	Min	Max
roast	62.0	20	97
steak	58.3	20	89
Juiciness			
roast	66.4	30	94
steak	70.9	50	94
Intensity of flavor			
roast	58.6	50	70
steak	56.8	48	70
ground	62.6	55	70

Figure 1. Frequency of responses by chefs of attributes important to consider for adding yak to a menu.