*Literature Review on the Welfare Implications of the*

# *Veal Calf Husbandry*

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## THE ISSUE

Veal is soft, pale meat obtained from young calves. Meat from calves slaughtered within a few days of age is called 'bob' veal but most veal comes from calves raised to approximately 16 to 20 weeks of age.[1] Most calves raised for veal are bull calves from the dairy industry. The traditional approach to producing veal in the United States keeps calves in individual housing until slaughter and the calves are often tethered. Calves raised for veal are fed a liquid milk-replacer diet to produce what is variously called white,[2,3] special-fed,[4] milk-fed[3] or formula-fed[1,2] veal. The diet fed to calves used to produce traditional veal is intentionally deficient in iron to produce the pale color of the meat. Calves raised for veal are fed a liquid-only diet and their rumens do not develop. The animal welfare issues involved therefore include housing calves so that they cannot turn around during the 4- to 5-month growing period; iron deficiency leading to anemia; and provision of a liquid-only diet, which leads to a lack of rumen development. In the United States individual stalls or pens are currently the norm,[2] but the industry plans to transition to housing in group pens by 2017.[5]

## TRANSPORTATION AND HANDLING

Veal calves are typically transported from dairies within 24 hours of their birth. They are often commingled with calves from other farms during transport and may also be commingled at cattle sales or collection points. Transportation and mixing may increase stress and exposure to pathogens, and may contribute to the emergence of clinical signs of respiratory disease.[6] Calves will also tend to display an initial fear of handlers, but this can be greatly reduced through regular, sensitive handling by familiar personnel.[7,8,9] Transport from the rearing facility to slaughter may also have adverse effects in terms of animal stress[10] and meat quality. [10,11]

## HOUSING

***Group housing—*** Calves are motivated to have social contact with other calves, and that motivation is significantly greater for full-body rather than head-to-head contact through bars.[12] In addition, calves kept in individual stalls or pens (as compared to hutches and yards) were more active when released into a larger area, suggesting a pent-up motivation for exercise. Because of greater space availability, group housing may allow a more natural and comfortable lying position[13] as well as increased social behaviors.[13] Expansive social housing reduces repetitive oral behaviors during the first 6 weeks of rearing, and decreases the incidence of hairballs in the rumen.[14]

However, group housing can lead to expressions of suckling behavior that are harmful to health (e.g. cross sucking, urine drinking, tail biting[15]). Group housing must be combined with practices such as regrouping to avoid disparities in size, and automated teat feeding to avoid cross-sucking. Data from some studies indicate group-housed calves had greater incidences of disease and more deaths (up to 7% greater), whereas results of other studies suggested no significant differences.[15] Groups housing may also

be associated with darker meat[15] although tenderness and flavor are not adversely affected.[15] The opposite effect has also been found with group-housed calves having lighter meat,[16] implicating factors other than group housing *per se*.

***Individual housing—***Individual housing configurations vary. Common configurations include tether stalls, individual stalls or pens, and group pens. Tether stalls keep calves cleaner than individual pens.[17] When individual pens are smaller, more swelling of calves' knees is observed.[17]

## DIET

***Colostrum—***Newborn calves lack circulating antibodies and their early immunity is conferred by ingestion of colostrum from the cow. Many veal calves receive no colostrum or insufficient colostrum (i.e., deficiency in 43-78% of calves[a]).[18,19,20,21] Colostrum intake is desirable for the farmer but there is often not a practical way to ensure it occurs when purchasing calves through intermediaries.[3] It has been suggested that liquid feed confers some antibody-based protection from dangerous bacteria such as *E Coli* 0157:H7, which is found at a lower prevalence in special-fed veal calves than dairy calves, however it is possible that other factors such as use of antibiotics or reduced exposure to vectors are responsible for this difference.[22]

***Liquid and solid feed—*** The diet of special-fed veal calves in the United States is often entirely liquid. Dry feed is required for the development of the rumen in the calf. The veal industry considers rumen development to alter the flavor of the meat of veal calves.[23] When offered dry feed isolated calves consume small amounts within the first few days increasing to significant amounts within two weeks[24] and this roughage is their main source of iron intake. European law requires the feeding of roughage.[25] The addition of non-liquid elements such as concentrates,[27] pellets[26] and fibers can increase[27] or decrease[26] problems with embedded hairs and hairballs depending on composition and delivery of the feed. Several studies found that grain feeding reduced incidence of scours[40] and so reduced the need to medicate calves[40,29] and to cull them. [40]

***Iron—***Another key quality of veal calf nutrition is that it is low in iron to produce meat with a pale appearance. This requires what one author described as *"a borderline condition of anemia"*[39] and leads to clinical anemia in some animals[4] (e.g., 10%)[18] which is a state that makes an animal more easily exhausted and more susceptible to metabolic acidosis.[28] Feeding of monosodium phosphate and Vitamin E can assist in producing pale meat while reducing the risk of anemia.[39]

## HEALTH

Overall losses due to death and culling of veal calves have been reported at 2.5 to 8.8%.[a,2,20,34,29]

***Disease—***Leading causes of calf death include respiratory[4,34] or digestive infections.[4,34] Most calves are preventively treated with antimicrobials upon arrival and many receive additional therapeutic treatments during the production period.

***Repetitive behavior—***Sucking may be a behavior that needs to occur for normal digestion and to produce feelings of satiety.[30] When calves do not have opportunities to suckle they tend to spend time licking or sucking either inanimate objects when housed in individually,[4] or other calves when housed in groups. Repetitive oral behaviors are often recorded for 10 to 35% of the observation period.[4,14] Repetitive sucking is reduced when calves are given brief opportunities to suckle from their dam (15 minutes a day).[31] Other interventions that reduce these oral behaviors include providing additional water.[32]

***Digestive health—***Abomasal ulcers are very common in calves, affecting approximately 87%.[33] There is evidence that abomasal ulcers are at least partially the result of overfilling; other factors such as infection and stress have been suggested but not documented as contributing factors.[33] When nursing from a cow, calves will ingest 4 to 10 smaller meals; veal calves are usually fed two larger daily meals. These few, large meals may contribute to a higher incidence of ulcers[25,34] and to impaired homeostasis of blood metabolites potentially leading to hyperglycemia and related complications.[35,36] The use of

[a] 2.5, 5.1%, 6.2, 8.8%.

automatic feeders allows more frequent, smaller meals to be given using a teat, which also allows suckling behavior.

## ALTERNATIVES

Calves reared in groups on bedding or with solid feed may have darker meat and this is sometimes marketed as a welfare-friendly product (e.g., "rose veal").[37] A Canadian study found consumers in a supermarket did not seem to have a strong color preference with 50% of those surveyed saying that they preferred pale veal and tending to select pale cuts and the other 50% tending to preferentially select darker veal.[38] Expert taste panels are often unable to detect unfavorable flavor differences based on veal color[39,40] and this is not currently considered an indicator of meat quality *per se*.[41] However, veal in the United States is predominantly purchased by restaurants, and their clientele may have intransigent color expectations.

Although they are not as efficient as beef breeds for the purpose of meat production, Holsteins are increasingly being raised to adult weights in feedlots. Dairy beef has some desirable traits including being a uniform, high-quality product.

## ATTITUDES

Consumers rarely spontaneously offer animal welfare as a food issue that concerns them, but when asked they rate this as a matter of high concern especially in relation to veal.[42] Veal "crates" are often the target of campaigns.[43] Results of surveys of those representing different nationalities and other demographic groups have identified a variable but substantial proportion of individuals who do not accept individual housing of calves (70% in one study)[44] or who do not believe veal calves are raised humanely (23% in one study).[45] Veal has been described by some members of the public as being animal agriculture "at its worst"[46] and refusal to eat veal is approximately as mainstream as avoiding fur or cosmetics tested on animals.[46] The need for alternatives to traditional calf raising systems has been recognized by the industry for some time.[48,47] Public concerns about animal welfare seem to focus primarily on the appearance of small stalls[1] that do not provide full social contact, and the industry has responded by developing yard and pen housing systems.[48] Group housing is already mandated in Europe.[25] Veal, however, is also perceived as a prestigious product and the veal market remains substantial with The National Cattlemen's Beef Association reporting that 64% of fine dining restaurants have veal on the menu.[49]

## SUMMARY

Under the current system there needs to be some disposition for bull calves produced as part of the dairy industry. Currently veal production is one of the main options for utilizing these calves. The veal industry in the United States is moving away from individual stall housing in response to public pressure to see calves raised under less confined conditions. Refinements will be necessary to ensure group housing is introduced without creating disease and cross-sucking problems. Further refinements are also needed to balance the requirements of the restaurant and household customer with risks to the health of calves currently being maintained throughout the growing period on a low-iron liquid diet.

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