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## *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.<sup>1</sup> 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,<sup>2,3</sup> special-fed,<sup>4</sup> milk-fed or formula-fed<sup>1,2</sup> 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,<sup>2</sup> but the industry plans to transition to housing in group pens by 2017.<sup>5</sup>

### 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.<sup>6</sup> Calves will also tend to display an initial fear of handlers, but this can be greatly reduced through regular, sensitive handling by familiar personnel.<sup>7,8,9</sup> Transport from the rearing facility to slaughter may also have adverse effects in terms of animal stress<sup>10</sup> and meat quality.<sup>10,11</sup>

### 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.<sup>12</sup> 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<sup>13</sup> as well as increased social behaviors. Expansive social housing reduces repetitive oral behaviors during the first 6 weeks of rearing, and decreases the incidence of hairballs in the rumen.<sup>14</sup>

However, group housing can lead to expressions of suckling behavior that are harmful to health (e.g. cross sucking, urine drinking, tail biting). 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.<sup>15</sup> Groups housing may also be associated with darker meat although tenderness and flavor are not adversely affected. The opposite effect has also been found with group-housed calves having lighter meat,<sup>16</sup> 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.<sup>17</sup> When individual pens are smaller, more swelling of calves' knees is observed.

## 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<sup>a</sup>).<sup>18,19,20,21</sup> Colostrum intake is desirable for the farmer but there is often not a practical way to ensure it occurs when purchasing calves through intermediaries. 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.<sup>22</sup>

**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.<sup>23</sup> When offered dry feed isolated calves consume small amounts within the first few days increasing to significant amounts within two weeks<sup>24</sup> and this roughage is their main source of iron intake. European law requires the feeding of roughage.<sup>25</sup> The addition of non-liquid elements such as concentrates, pellets<sup>26</sup> and fibers can increase<sup>27</sup> or decrease problems with embedded hairs and hairballs depending on composition and delivery of the feed. Several studies found that grain feeding reduced incidence of scours and so reduced the need to medicate calves<sup>40,29</sup> and to cull them.<sup>40</sup>

**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*” and leads to clinical anemia in some animals (e.g., 10%) which is a state that makes an animal more easily exhausted and more susceptible to metabolic acidosis.<sup>28</sup> Feeding of monosodium phosphate and Vitamin E can assist in producing pale meat while reducing the risk of anemia.

## HEALTH

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

**Disease**—Leading causes of calf death include respiratory<sup>4,34</sup> or digestive infections.<sup>4,34</sup> 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.<sup>30</sup> When calves do not have opportunities to suckle they tend to spend time licking or sucking either inanimate objects when housed in individually, or other calves when housed in groups. Repetitive oral behaviors are often recorded for 10 to 35% of the observation period.<sup>4,14</sup> Repetitive sucking is reduced when calves are given brief opportunities to suckle from their dam (15 minutes a day).<sup>31</sup> Other interventions that reduce these oral behaviors include providing additional water.<sup>32</sup>

**Digestive health**—Abomasal ulcers are very common in calves, affecting approximately 87%.<sup>33</sup> 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. 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<sup>25,34</sup> and to impaired homeostasis of blood metabolites potentially leading to hyperglycemia and related complications.<sup>35,36</sup> The use of automatic feeders allows more frequent, smaller meals to be given using a teat, which also allows suckling behavior.

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<sup>a</sup> 2.5, 5.1%, 6.2, 8.8%.

## 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”).<sup>37</sup> 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.<sup>38</sup> Expert taste panels are often unable to detect unfavorable flavor differences based on veal color<sup>39,40</sup> and this is not currently considered an indicator of meat quality *per se*.<sup>41</sup> 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.<sup>42</sup> Veal “crates” are often the target of campaigns.<sup>43</sup> 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)<sup>44</sup> or who do not believe veal calves are raised humanely (23% in one study).<sup>45</sup> Veal has been described by some members of the public as being animal agriculture “at its worst”<sup>46</sup> and refusal to eat veal is approximately as mainstream as avoiding fur or cosmetics tested on animals. The need for alternatives to traditional calf raising systems has been recognized by the industry for some time.<sup>48,47</sup> Public concerns about animal welfare seem to focus primarily on the appearance of small stalls that do not provide full social contact, and the industry has responded by developing yard and pen housing systems.<sup>48</sup> Group housing is already mandated in Europe. 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.<sup>49</sup>

## 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.

## REFERENCES

1. Schwartz A, The politics of formula-fed veal calf production. *J Am Vet Med Ass* 1990;196:1578-1586.
2. Sargeant JM, Blackwell TE, Martin W, et al. Production practices, calf health and mortality on six white veal farms in Ontario. *Can J Vet Res* 1994;58:180-195.
3. Palechek NP, Schoonderwoerd M, Perry AW. A case study of respiratory disease in a veal calf operation. *Can Vet J* 1987;28:363-365.
4. McFarlane JM, Morris GL, Curtis SE, et al. Some indicators of welfare of crated veal calves on three dietary iron regimens. *J Anim Sci* 1988;66:317-325.
5. Izenberg D. Deal on veal: will it improve a calf's life? *Macleans* 2007;120:35.
6. Mormede P, Soissons J, Bluthe RM, et al. Effect of transportation on blood serum composition, disease incidence, and production traits in young calves. Influence of journey duration. *Ann Rech Vet* 1982;13:369-384.

7. Lensink BJ, Veissier I, Florand L. The farmers' influence on calves' behaviour, health and production of a veal unit. *An Sci* 2001;72:105-116.
8. Lensink J, Bossy A, Veissier I. The relationship between farmers' attitude and behaviour towards calves, and productivity of veal units. *Ann Zootech* 2000;49:313-327.
9. Lensink BJ, Boivin X, Pradel P, et al. Reducing veal calves' reactivity to people by providing additional human contact. *J Anim Sci* 2000;78:1213-1218.
10. Grigor P, Cockram M, Steele W. A comparison of the welfare and meat quality of veal calves slaughtered on farm with those subjected to transport and lairage. *Livestock Prod Sci* 2004;91:219-228
11. Fernandez X, Monin G, Culioli J et al. Effect of duration of feed withdrawal and transportation time on muscle characteristics and quality in Friesian-Holstein calves. *J Anim Sci* 1996;74:1576-1583.
12. Holm L, Jensen MB, Jeppesen LL. Calves' motivation for access to two different types of social contact measured by operant conditioning. *Appl Anim Behav Sci* 2002;79:175-194.
13. Andrighetto I, Gottardo F, Andreoli D, et al. Effect of type of housing on veal calf performance, behavior and meat quality. *Livestock Production Sci*;57:137-145.
14. Van der Mei, J. Tail necrosis and tail biting in veal calves in group housing. *Tijdschr Diergeneesk* 1986;111:83-85.
15. Bokkers EAM, Koene P. Activity, oral behaviour and slaughter data as welfare indicators in veal calves: a comparison of three housing systems. *Appl Anim Behav Sci* 2001;75:1-15.
16. Sabbioni A, Beretti V, Bertocchi A, et al. Effect of housing type on veal calf performance. *Ann Fac Medic di Parma* 2005;25:111-122.
17. Terosky TL, Wilson LL, Stull CL, et al. Effects of individual Housing Design and Size on Special-Fed Holstein Veal Calf Growth Performance, Hematology, and Carcass Characteristics. *J Anim Sci* 1999;75:1697-1703.
18. Stull CL, McDonough SP. Multidisciplinary approach to evaluating welfare of veal calves in commercial facilities. *J Anim Sci* 1994;72:2518-2524.
19. Gray ML, Bounous DI, Kelley LC, et al. Icterus in bob veal calves and its association with lack of colostrum intake and high serum creatine kinase activity. *Am J Vet Res* 1995;56:1506-1512.
20. Wilson LL, Smith JL, Smith DL, et al. Characteristics of veal calves upon arrival, at 28 and 84 days, and at end of the production cycle. *J Dairy Sci* 2000;83:843-854.
21. Wilson LL, Egan CL, Drake TR. Blood, growth and other characteristics of special-fed veal calves in private cooperator herds. *J Dairy Sci* 1994;77:2477-2483.
22. Cristancho L, Johnson RP, McEwen SA, et al. Escherichia coli 0157:H7 and other Shiga toxin-producing E. coli in white veal calves. *Vet Microbiology* 2008;126:200-209.
23. Industry information: facts. The veal farm Available at: <http://www.vealfarm.com/industry-info/facts.asp> Accessed June 23, 2008
24. Maas J, Robinson PH. Preparing Holstein steer calves for the feedlot. *Vet Clin Food Anim* 2007;23:269-279.
25. Veissier I, Boissy A, dePassille J, et al. Calves' responses to repeated social regrouping and relocation. *J Anim Sci* 2001;79:2580-2593.
26. Morisse JP, Huonnic D, Cotte JP, et al. The effect of four fibrous feed supplementations on different welfare traits in veal calves. *Animal Feed Science and Technology* 2000;84:129-136.
27. Suarez BJ, Van Reene CG, Gerrits WJJ, et al. Effects of supplementing concentrated differing in carbohydrate composition in veal calf diets: II. rumen development. *J Dairy Sci* 2006;89:4376-4386.
28. Reece WO. Response of anemic calves to exertion. *Am J Vet Res* 1984;45:437-439.
29. Sargeant KM, Blackwell TE, Martin SW. Production indices, calf health and mortality on seven red veal farms in Ontario. *Can J Vet Res* 1994;58:196-201.
30. De Passille AMB, Christopherson RJ, Rushen J. Sucking behaviour affects the postprandial secretion of digestive hormones in the calf. Society for Veterinary Ethology 25th anniversary 1966-1991, Applied Animal Behaviour: Past, present and Future—proceedings of the international congress, Edinburgh 1991, 130-131.
31. Margerison JK, Preston TR, Berry N, et al. Cross-sucking and other oral behaviours in calves, and their relation to cow suckling and food provision. *Appl Anim Behav Sci* 2003;80:277-286.
32. Gottardo F, Mattiello S, Cozzi G, et al. The provision of drinking water to veal calves for welfare purposes. *J Anim Sci* 2002;80:2362-2372.
33. Welchmen DdeB, Baust GN. A survey of abomasal ulceration in veal calves. *Vet Rec* 1987;121:586-590.
34. Ahmed AF, Constable PD, Misk NA. Effect of feeding frequency and route of administration on abomasal luminal pH in dairy calves fed milk replacer. *J Dairy Sci* 2002;85:1502-1508.
35. Kaufhold JN, Hammon HM, Bruckmaier RM et al. Postprandial metabolism and endocrine status in veal calves fed at different frequencies. *J Dairy Sci* 2000;83:2480-2490.
36. Vicari T, vanden Borne JJGC, Gerrits WJJ, et al. Postprandial blood hormone and metabolite concentrations influenced by feeding frequency and feeding level in veal calves. *Domestic Anim Endocrinology* 2008;34:74-88.
37. Short W. The future for veal is looking distinctly rosy. *Farmers Weekly* 2006;144:54-55.

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38. West GW, Larue B, Gendron C, et al. Consumer confusion over the significance of meat attributes: the case of veal. *J Consumer Policy* 2002;25:65-88.
  39. Agboola HA, Cahill VR, Conrad HR, et al. The effects of individual and combined feeding of high monosodium phosphate and alpha tocopherol supplemented milk replacer diets and an alternative protein diet on muscle color, composition and cholesterol content of veal. *J Anim Sci* 1990;68:117-127.
  40. Johnson DD, Van Horn HH, West RL, et al. Effect of calf management on carcass characteristics and palatability traits of veal calves. *J Dairy Sci* 1992;75:2799-2804.
  41. Severiano-Perez P, Vivar-Quintana AM, Revilla I. Determination and evaluation of the parameters affecting the choice of veal meat of the "Ternera de Aliste" quality appellation. *Meat Sci* 2006;73:491-497.
  42. Ouedraogo AP. Consumers' concern about animal welfare and the impact on food choice: social and ethical concern. Workshop: "Teaching Animal Bioethics in Agricultural and Veterinary Higher Education in Europe". INPL - Nancy, 23 & 24 May 2002.
  43. Fiala J. 2007. HSUS to target animal confinement in California. *DVM Newsmagazine*, October 2007, 14.
  44. Murphey MW, Skaggs CL, Pierce DW, et al. Attitudes and perceptions of introductory animal science students on animal production practices. *J Anim Sci* 1997;75:S276.
  45. Rowan AN. Animal well-being: key philosophical, ethical, political, and public issues affecting food animal agriculture. Food Animal Well-Being 1993 Conference Proceedings and Deliberations USDA and Purdue University Office of Agricultural Research Programs West Lafayette, Indiana.
  46. Rollin E. *Farm Animal Welfare: Social, Bioethical, and Research Issues*. Ames: Iowa State Press. 1995. pp.65
  47. Albright JL. Dairy animal welfare: current and needed research. *J Dairy Sci* 1987;70:2711-2731.
  48. Swannack K. Systems of management for raising young calves. *Farm Practice* 1982;4: 5-10.
  49. Nation Cattlemen's beef Association website. Checkoff Puts Veal Front and Center -- October 1, 2001. Available at: <http://www.beefusa.org/newscheckoffputsvealfrontandcenter--october120013827.aspx>. Accessed September 28, 2007.