

1 Challenging the Norm: Herd Check... for 2 Calves?

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6 7 Abstract

8
9 Replacement heifers represent the future investment and of any dairy to continue to introduce new, younger animals
10 to the herd to be able to cull older, genetically inferior, reproductively spent, sick, or dead cows. Although
11 management of dairy calves varies heavily from region to region and farm to farm, veterinarians should and do play
12 a very important role in the decisions made on dairy operations regarding several critical control points, such as:
13 number of replacement animals to generate and/or keep, newborn processing and management, nutrition, disease
14 detection and mitigation, and inter- or intra-farm benchmarking and goal setting.

15 Veterinarians can work with producers to establish “calf health programs” that allow regular, scheduled visits to the
16 farm by the veterinarian to focus on calf health and disease mitigation/detection. Understanding five key points
17 regarding calf health and performance and how the MOAT approach (measure, observe, aim, and tracking) can be
18 implemented at each of those points is important to generate discussion and change, and to improve calf health.

19 These five points are:

20 Colostrum

21 Cleanliness

22 Comfort

23 Calories

24 Consistency

25 Thoracic ultrasound (TUS) of pre-weaned calves is the foundation of “calf health programs,” and is an important
26 calf-side disease diagnostic that can be performed regularly to help the veterinarian identify violations in the
27 implementation of those five key points.

28 Keywords

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30 health, dairy calves, pneumonia, thoracic

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32 Why Calf Health Programs Matter

33 The current dairy economic climate has drastically encouraged progressive producers to raise fewer replacement
34 animals and generate beef-dairy cross calves to capitalize on the current market highs beef-cross calves are bringing.
35 This strategy is two-fold as well; by generating more beef-dairy cross calves and raising fewer (or only the
36 necessary number) heifer calves, dairy enterprises can not only generate greater revenue off a necessarily created
37 pregnancy, but also decrease cash outflow in the form of heifer rearing cost. Because of these factors, focus on calf
38 health has become increasingly important since producers have fewer heifers to cull, making the ones they do have
39 more valuable to the operation. Many dairies are implementing these breeding strategies to optimize cash-flow.
40 Currently, the United States national dairy heifer inventory is at a twenty-year low¹, meaning that the supply-
41 demand principles of open markets is favoring high replacement costs if a dairy operation would need to buy
42 additional replacements.

43 Calf health programs allow regular monitoring, detection, involvement and consultation by the veterinarian on
44 dairies raising their own calves to make the most out of the dairies’ investment on the female dairy calves they

45 decided to keep as replacements. Veterinarians need to be cognizant that many of their clients may be seeking
46 services they can provide but haven't asked for. By being proactive instead of acting reactively (such as when a
47 producer presents a problem with calf health to the veterinarian), many discussions, changes, and monitoring that the
48 veterinarian can assist with can be dealt with before an issue arises. Veterinarians often take on a reactive role in
49 communication with clients², whereas a proactive approach benefits all parties involved.

50 MOAT Approach and the "Five C's"

51 The MOAT approach can be implemented when addressing any number of health parameters of herd medicine. The
52 acronym represents measure, observe, aim, and tracking. Their utility in calf health consultation can help generate
53 discussion and change within a calf program.

54 Measure: generating numerical data

55 Observe: visual inspection

56 Aim: goal setting

57 Tracking: data change over time

58 This approach, when used in conjunction with the "five C's" of calf rearing, can create consultation points for the
59 veterinarian by identifying violations in these five points. For example, measuring, aiming, and tracking the amount
60 of total milk solids fed to pre-weaned calves can identify weak points, in the number of calories offered and the
61 consistency of the milk ration. Another example would be to simply observe a dairy employee using an esophageal
62 feeder to administer colostrum to a newborn calf to ensure it is being performed to the standard that is set by the
63 dairy and the veterinarian.

64 Colostrum

65 Current Dairy Calf and Heifer Association recommendations are to feed 10% of the calf's body weight of > 22%
66 Brix, with a standard plate count of < 50,000 CFU/mL and < 5,000 CFU/mL coliforms³. Measuring and tracking
67 these benchmarks on a regular basis along with educating farm staff of their significance in calf health are important
68 to decrease disease incidence. Setting goals (aim) to attain serum total proteins above specific levels can help

69 monitor the efficacy in which employees are getting clean, quality colostrum into calves on time. Additionally,
70 tracking these data over time will identify weak points in the logistics of timely, clean colostrum administration, or
71 identify farm staff needing education on the importance of colostrum on calf health.

72 Cleanliness

73 Several MOAT points can be utilized in maintaining cleanliness in calf feeding equipment, colostrum collection
74 equipment, and calf environment, but observation is by far the most important. Understanding the critical control
75 points regarding what can become dirty with continued use is a great starting point for identifying what needs to be
76 cleaned and disinfected. Everything from colostrum collection equipment and storage to the environment that the
77 calf will spend her pre-weaned time in all has to be evaluated and monitored. Measuring hygiene of colostrum and
78 milk feeding equipment can be done using a digital luminometer. Tracking these values over time after proper
79 cleaning and disinfecting or even to spot check when there are no calf health issues present are good practices to
80 ensure calves are not exposed to oral pathogens that will halt calf health. If for example, an esophageal feeder is
81 observed to be visually dirty, there is hardly any benefit to using a luminometer to measure the relative
82 luminescence units reported. Simple, regular observation can identify many hygiene issues in a calf program by
83 examining where farm employees may overlook. Spot checking with a luminometer unannounced to the calf team
84 can identify weaknesses or lapses in hygiene since most people will perform their jobs correctly when they know
85 they are being watched to do so.

86 Comfort

87 Although there are a few objective strategies to evaluate how comfortable calves are in their environment, the
88 predominant one would be observation, which can be highly subjective. Nesting scores help to quantify the amount
89 of bedding, especially in cold environments, but observing on the day the calves are being bedded can reveal some
90 shortfalls in bedding frequency or amount of aerosolized particulate matter when bedding. Objective measures to
91 assess calf comfort are utilization of temperature data loggers to measure the microenvironment of the calf,
92 anemometers to assess air flow within calf barns, and tracking of data such as disease treatment rates or TUS scores
93 in times of thermal stress. Overall assessment of the calf environment should assess the humidity of calf barns,
94 moisture of the bedding, shelter from the elements, air quality and ventilation, and overall fly pressure.

95 Calories

96 Probably the most debated topic over the last three to four decades regarding calf care is calories offered in the fluid
97 ration. How many are enough and how many are too many that it may inhibit solid feed intake and therefore inhibit
98 the development of the calf's gastrointestinal system to transition to solid feed? Average daily gain (ADG) is a
99 common metric used to assess if calves are receiving adequate calories to achieve desired growth. Several
100 studies^{4,5,6,7} have evaluated the amount of milk or milk replacer fed to calves to assess its impact on future milk
101 production or health of the pre-weaned calf. With some conflicting findings on ADG and future performance, these
102 studies all suggest that a higher nutritional plane benefits calf health and therefore future performance. Veterinarians
103 should voice in favor of adequate nutrition to increase the overall wellbeing and health of pre-weaned calves.

104 Several MOAT points can be used to assess calf nutrition. For example, calculating the number of calories currently
105 offered to calves can be measured against what the daily caloric requirements of pre-weaned calves are at different
106 ages to determine that calves can mount an appropriate immune response in the presence of disease challenge.

107 Additionally, pairing TUS scores or treatment data can monitor lower ambient temperature and its effect on the
108 ultrasound scores. If the calves exhibit a greater proportion or severity of TUS scores in lower temperatures, this will
109 possibly indicate that calves are not receiving adequate nutrition to maintain core body temperature and respond to
110 disease challenge at the same time.

111 Consistency

112 The most suitable parameter for measurement, aiming, and tracking is consistency. This includes but is not limited
113 to consistency of timing of feeding, volume and temperature of fluid ration fed, total solids, cleanliness, and
114 osmolality of the fluid ration. Regular monitoring of these parameters will either reveal pitfalls in consistency, or at
115 a minimum, rule out that consistency could be the issue when calf problems present. Either evaluating social or
116 physiological stress that calves may encounter, designing a calf program that upholds consistency will minimize
117 stress. Milk replacer or pasteurized milk with an added balancer can pose a challenge regarding osmolality if the
118 solid product is not being added consistently or is of poor quality. For example, fluid rations that are hyperosmolar
119 (>450 mOsm/kg) present a threat to gastrointestinal permeability, and therefore a detriment to calf health. Working

120 with farm staff to establish goals of total solids fed and consistency parameters in all aspects of the fluid ration is
121 important to minimize social and physiological stress on calves.

122 Thoracic Ultrasound as a Building Block of Calf Health

123 The utility of TUS as a tool to identify calves with subclinical pneumonia can be as simple as that, a detection tool.
124 When TUS is implemented on farm in conjunction with awareness of the “five C’s,” it helps the veterinarian
125 identify issues that can or have impacted calf health in a negative way. Metaphorically speaking, clinical treatment
126 rates of calfhoo pneumonia is only the tip of the iceberg of the underlying issue. For example, if the subclinical rate
127 is high, but treatment rate is very low, conversations should first be focused on pneumonia detection by farm
128 employees, considering some of the subclinical infections probably manifested clinically at some point in time.
129 Additionally, this same scenario may indicate that calf health is being haltered earlier in life such as high rates of
130 scours, sepsis, navel infections, or failure of passive transfer. TUS allows the veterinarian to deeper assess a calf
131 program in multiple ways and sets the precedent of routine, regular visits by the veterinarian. By establishing regular
132 visits to detect subclinical pneumonia, the foundation of consistent dialogue, monitoring, and consultation is set.
133 Focus then shifts from simple detection and intervention, to measuring, observing, aiming, and tracking of these and
134 other data generated to help improve calf health overall.

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136 Conclusions

137 Veterinarians should always advocate for improving animal health, and further involvement with calf programs
138 aided by TUS allow for identification or avoiding issues that pose a threat to calf health. Many veterinarians can
139 assess a calf program by utilizing the MOAT approach to aid in prevention and troubleshooting issues with calf
140 health but fail to achieve consistent consulting opportunities without the aid of TUS. By combining TUS, the MOAT
141 approach applied to the “five C’s,” and data analysis, veterinarians can be an integral part of the calf care team on
142 dairies by generating useful data to garner change, develop relationships, and progress calf health in diary calves.

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