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Dairy producer perceptions toward male dairy calves in the Midwestern United States

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Male dairy calves are often sold from the farm of birth within the first few days of life. Research describing the care of male calves is limited, with an emphasis on parsing differences between the care of male and female calves. The aims of this study were to describe dairy producers' self-reported care practices for male relative to female calves, as well as their perceptions toward male calf care and welfare. Overall, 24 dairy producers in Ohio and Indiana participated in 1 in-person focus group (n = 10) or were individually interviewed (n = 14) using a semi-structured questionnaire with closed and open-ended questions about neonatal calf care and welfare. Discussions were audio recorded and transcribed verbatim. Data from closed-ended questions are described quantitatively, and thematic analysis was used to identify common themes discussed by producers for open-ended questions. A majority of producers described using different care protocols for male and female dairy calves (64%; 9/14 interview participants). Low input care practices were more commonly consistent between male and female calves, such as colostrum protocols (71%; 10/14 interview participants) and navel care (100%; 14/14 interview participants) than more costly treatments. Of the producers that provided disease prevention products to female calves (79%; 11/14 interview participants), only a few also administered them to male calves (27%; 3/11 interview participants). Three major themes were constructed from the open-ended questions, including factors affecting male dairy calf care, attitude toward male calf welfare, and opportunities to improve male dairy calf welfare. Producers described multiple factors that influenced male calf care on the dairy, such as time and money required to care for them. There was divergence in concern among producers about male calf welfare, with some producers expressing concern, particularly for calves slaughtered soon after birth; yet others described feelings of indifference about the topic. Potential ways to improve male calf welfare, including greater sale prices and the involvement in specialized marketing schemes, were suggested by some producers. These

findings highlight potential concerns for male calf welfare and ways to improve future care on dairy farms.

KEYWORDS

animal welfare, dairy producer, male dairy calf, newborn care, producer perspectives

1 Introduction

Male dairy calves are surplus to the requirement of dairy production, and thus, are often sold from the dairy farm in early life. In the United States, male calves are generally sold within days of birth (Shivley et al., 2019) for veal or dairy beef production (Perdue and Hamer, 2017). Raising young male dairy calves for meat, particularly veal, is a contentious issue that has received public scrutiny in the United States (e.g., California Prop 2, 2008) and globally (reviewed by Bolton and von Keyserlingk, 2021). Recent research documents welfare concerns for male calves throughout the production chain (reviewed by Creutzinger et al., 2021), yet care practices that significantly impact calf welfare begin on the dairy farm during the first hours of life. Best practices for promoting neonatal calf welfare are well described, including management of maternity facilities, colostrum management, and umbilical care (Mee, 2008). Still, providing optimal care to calves during the first hours of life remains a challenge for dairy producers (Wilson et al., 2021).

Some evidence suggests that male calves receive a lower standard of care than replacement heifer calves. For example, a recent study in the United States found that male calves were more likely than female calves to receive a lower total volume of colostrum, have delayed colostrum feedings, or be left with the dam as a mechanism to feed colostrum (Shivley et al., 2019). Further, Renaud et al. (2017) reported 9% of Canadian dairy producers did not always feed colostrum to male calves. Although this research suggests discrepancies in postnatal care between male and female calves, it predominantly focuses on colostrum management, and there is little research that describes other neonatal care practices, with emphasis on parsing differences between male and female calves.

Understanding male calf care practices, as well as the factors that influence these practices, can yield useful information to improve calf welfare (Wolf et al., 2016). Sharing farm-specific information with producers motivates dairy producers to change calf management in ways that improve calf welfare. For example, most dairy producers made at least 1 improvement to colostrum management practices after receiving a benchmark report of their cohort, which in turn reduced the prevalence of failed transfer of passive immunity (Atkinson et al., 2017). Further,

benchmarking herd level calf outcomes brought an awareness to Canadian dairy producers which increased their motivation to improve dairy calf care (Sumner et al., 2018). Recently, Wilson et al. (2021) found dairy producers in Ontario were motivated by social norms and feelings of ethical obligation to provide appropriate care to male calves, but often felt limited by economic constraints and prioritization of resources to the milking herd. A better understanding of United States dairy producers' attitudes toward male dairy calves may elucidate gaps in care and areas for improvement.

Considering the knowledge gap regarding male calf care on dairy farms in the United States, it is important to investigate this topic area using social science (Knight and Barnett, 2008). Focus groups (Plummer-D'Amato, 2017) and one-on-one interviews (Ryan et al., 2009) are widely used as data collection tools in social science, and these methods can contribute to in-depth data collection regarding an individual's experiences, understandings, and perspectives on a given topic. The objectives of this study were to describe dairy producers' 1) self-reported care practices for male dairy calves relative to female dairy calves and 2) understand perceptions of male dairy care and welfare.

2 Materials and methods

This study was approved by The Ohio State University Institutional Review Board under IRB2020E0585. Verbal or written informed consent was given by all study participants. The Standards for Reporting Qualitative Research helped inform and structure this scientific paper (O'Brien et al., 2014).

2.1 Study design

This study was originally designed to implement focus group methodology to gain an understanding of newborn care practices for male and female calves, factors that influence calf care, as well as dairy producer perceptions on the welfare of male calves. However, after the completion of one focus group in February 2020, the methodology was changed to individual phone interviews in response to the SARS-CoV-2 pandemic.

Interviews were chosen as they are a valid method for collecting quantitative and qualitative data, especially when there is minimal information on a particular topic (Greenhalgh and Taylor, 1997), such as male calf care.

This study was designed from a critical realist perspective (Sturgiss and Clark, 2020) to facilitate our understanding of dairy producers' experiences relating to calf care, as influenced by the context of their lives and businesses. This perspective aligns with other research in animal science where researchers are trying to understand the complexity and context of animal welfare challenges on dairy farms (e.g., Wynands et al., 2021).

2.2 Participant recruitment

Dairy farm owners or employees involved in newborn calf care on farms in Ohio and Indiana with at least 50 lactating dairy cattle were eligible for study participation. Two Ohio-based veterinarians were initially contacted to invite their dairy producer clientele to participate in a focus group; purposive sampling based on networks in the researchers' community was used to contact individual veterinarians. However, only one focus group with 10 dairy producer participants was completed prior to the SARS-CoV-2 pandemic. After adapting the methodology due to the SARS-CoV-2 pandemic, purposive sampling was used to recruit participants for individual interviews. Dairy producers were initially contacted *via* email or telephone from a list of producers interested in attending the second focus group ($n = 14$); four producers were enrolled from this list. With their clients' permission, two additional veterinarians shared dairy client information with the research team; 2 and 3 producers were contacted and enrolled from these additional veterinary contacts, respectively. Another 5 producers were recruited by the research team through personal and professional contacts. All phone interviews were conducted between June and October 2020.

2.3 Focus group discussion

The focus group discussion followed a semi-structured discussion guide (Supplementary File 1) that was developed collaboratively between the co-authors and piloted with a group of dairy producers by faculty, a postdoctoral fellow, and students at The Ohio State University. Two questions were added to the questionnaire after the pilot focus group: one on the dairy producers' relationship with calf purchasers, and one on the producer's perception of male calf welfare.

Ten individuals participated in the focus group discussion in-person in March 2020. Prior to the start of the discussion, the focus group moderator reviewed the content of the consent form in detail. Briefly, the moderator provided an overview of the study aims, how long the discussion was expected to last and that

it would be recorded, participant rights and confidentiality, as well as the intended use of results. The moderator told participants that by participating, they consented to their de-identified comments being included in the reported results, however, they were able to choose not to answer specific questions and stop participating at any time. Study participants then provided written consent to participate. Before the focus group discussion began, producers completed a brief demographic survey, including their role on the farm, age, gender, and the number of cows and calves on the farm. Producers were then reminded by the moderators that the goal of the meeting was to discuss newborn calf care practices, including both male and female calves. Two moderators trained in qualitative methodology (JP, KG) facilitated the discussion group. The focus group discussion was audio recorded to assist data analysis and interpretation. The discussion was 72 minutes long and was transcribed in full by a professional transcription service (Rev.com, San Francisco, CA). Audio files were used to check the transcribed discussion for completion and accuracy. All moderators and participants were given unique numerical identifiers, and names were removed from the transcription for data storage and analysis.

2.4 Individual interviews

Fourteen dairy producers in Ohio and Indiana participated in semi-structured interviews using interview questions adapted from the focus group discussion guide. The focus group consent prompt delivered by the moderator was used to obtain participant consent in the interviews, with the major difference being that interview participants provided verbal consent prior to beginning the discussion. Semi-structured interviews were used as this style of interview can incorporate a series of open-ended questions, whereby the interviewer can use cues or prompts to encourage the interviewee to consider the question further or elaborate on the original response (Smith, 2012). All interviews were conducted by Zoom (Zoom Video Communications Inc., Version 5.9.7) and were recorded to facilitate note taking. One representative from the farm was present for all the interviews, except for one interview in which the farm owner also invited the calf manager to join the interview. One moderator trained in qualitative methodology (JP) led the interviews, while still allowing producers to guide the conversation. Another primary author (KC or SL) was present at each interview to ensure the moderator had addressed all the discussion guide questions. The interview guide (Supplementary File 2) included questions of farm demographics (Questions 1-4), and open-ended (Questions 5-10, 12, 14, 17, 18, 21-23) and closed-ended questions (Questions 1-4, 11, 13, 15, 16, 19, and 20) relating to neonatal calf care practices, marketing, and perceived welfare of male calves. If questions of interest were not explicitly addressed by the producer, follow-up probes were

asked to identify differences in calf care based on sex. The interview script was adapted to fit the modified study design from in-person focus groups to Zoom interviews and was piloted with one dairy producer before beginning interviews. No changes were made to the interview questionnaire after the pilot interview; this interview was omitted from the final dataset, as this producer's operation was in Florida.

Interviews ranged from 17 to 59 minutes (mean \pm standard deviation = 31.6 ± 14.0). Four interviews were transcribed by a member of the research group (SL), with the remaining ($n = 10$) transcribed by a professional service (Rev.com, San Francisco, CA) in the interest of time. Data saturation, defined as the point at which no new themes emerged, was reached following analysis of approximately two-thirds of the interviews (Saunders et al., 2018). This suggested the sample size was sufficient, especially as the participants were relatively homogeneous and selected according to common criteria (e.g., dairy producers within a similar region) (Guest et al., 2006).

2.5 Researchers and positionality

A researcher's positionality is the relationship between the researcher and participants, and between the researcher and the subject matter at hand. Researcher positionality can influence the data collection process and interpretation of the results (Cohen and Crabtree, 2008; Corlett and Mavin, 2018). Thus, including a positionality statement provides readers with context regarding the researcher and the subject matter in question (Mason-Bish, 2019). The research team included a mix of veterinary scholars (GH, DR), animal welfare scientists (JP, KC, KP), a social scientist (KG), and two graduate students (DW, SL). The authors' specific expertise was not disclosed to interview participants beyond that they were employees or students at The Ohio State University. The first author's (KC) positionality was influenced by her training in animal welfare, and she was familiar with calf care practices, including management of surplus dairy calves.

2.6 Data analysis

To determine if dairy producers used different neonatal care practices for male relative to female calves, responses from closed-ended questions from participants who were individually interviewed were used. The focus group was not used for this analysis as it was difficult to extract quantitative results from individual participants. Data from closed-ended questions (e.g., 1-4, 6, 11, 13, 15, 16, 19, and 20) were used to quantitatively describe calf care practices. Responses to questions on newborn management (e.g., colostrum, navel antiseptic, milk feeding, preventive health treatments) for male relative to female calves, age at sale, and marketing route were

entered into Microsoft Excel (Microsoft Corporation, Redmond, WA) for each farm. Male calf care practices were summarized by calculating the proportion of respondents that provided each practice as described in the interviews (no. producer responses/14 producers interviewed). Few producers described milk feeding practices (2/14) for male calves prior to sale, and as such these responses were not described in the results.

To describe dairy producers' perspectives on male calf care and welfare, a contextualist method of thematic analysis was used to determine important themes, using data attained from the focus group and individual interviews. This method of qualitative analysis focuses on the ways individuals perceive their own personal experiences (e.g., producer experiences relative to male calf care and welfare), in addition to the ways that broader social context impacts those experiences (i.e., perceptions of factors that influence calf care and welfare) (Braun and Clarke, 2006). Responses from both individual interviews and the focus group were analyzed using thematic analysis. Producer responses to open-ended (e.g., 5, 7-10, 12, 14, 17, 18, 21-23) questions were used to develop the themes and subthemes. An iterative data-driven approach was used, meaning that the thematic analysis was grounded in the data, and preconceived themes were not used to group extracts; this type of analysis is particularly useful when little is known about the topic area (e.g., male calf management) and an in-depth exploration of the data is necessary (Guest et al., 2011). Initially, the primary authors (KC, JP, SL) familiarized themselves with the data from one interview through repeated reading of the transcript and listening to the audio file; this process was informed by the social scientist on the research team with experience in thematic analysis (KG).

After data familiarization, one interview was initially coded by the primary authors line-by-line using NVivoTM software (Version 12, QSR International, Burlington, MA), and a preliminary codebook was developed that included a code label, definition, and example quotation. The 3 primary authors applied an inductive approach to coding the dataset (Bryman, 2012). Codes were applied to label passages that were relevant to the research objective, to describe dairy producers' perspectives on male calf care and welfare. Using the preliminary codebook, the primary authors met weekly thereafter to refine the codebook and codebook definitions based on any ambiguities encountered after independently coding three transcripts. This iterative process was used to continuously refine the codebook to group the codes into overarching themes until the primary authors affirmed the codebook accurately represented the data and was revised in collaboration with social scientists that had experience in thematic analysis (KG, DW).

Using the resultant codebook, KC coded all interviews and the focus group, making only slight refinements thereafter to eliminate duplication of coding the same data into more than one code. Any minor refinements were discussed with the other

coding authors (JP and SL) and a mutual decision was made (Creswell and Miller, 2000). The resultant themes and subthemes were then assessed from a deductive standpoint to answer the research questions and frame this work within the currently existing field of literature (Wilson et al., 2021).

Quotations are reported verbatim to illustrate key features of the themes that we identified with square brackets (i.e., [...]) used to insert clarifying text to ensure the meaning of the quote was maintained, and ellipses indicate a pause in the producers' response or omitted material if the producer digressed from their response to the respective question.

3 Results

3.1 Respondent characteristics and farm demographics

3.1.1 Focus group participants

Eight participants identified as farm owners and two participants as employees; one employee attended the focus group with the owner of the dairy (Table 1). All participants were involved in newborn calf care. Three participants were female and seven were male. All farms were located in Ohio (n =

TABLE 1 Focus group (n = 10) and interview (n = 14) participant details and farm demographics for dairy producers included in this study.

Participant ID	Role on the dairy	Age*	Gender	Breed	Number of lactating cows	Number of calves
FG_P1	Owner	54	Female	Holstein	320	32
FG_P2	Manager	23	Male	Holstein	620	Not stated
FG_P3	Owner	29	Male	Holstein	600	60
FG_P4*	Co-owner	47	Male	Holstein	130	12
FG_P5*	Employee	26	Male	Holstein	130	12
FG_P6	Owner	42	Male	Holstein	1050	100
FG_P7	Owner	32	Female	Jersey	380	35
FG_P8	Owner	56	Female	Holstein	250	25
FG_P9	Owner	24	Male	Holstein	186	34
FG_P10	Owner	24	Male	Holstein	85	20
I_P1	Co-owner	Not stated	Female	Jersey	65	10-12
I_P2	Manager	Not stated	Male	Holstein, Jersey	105	8
I_P3	Co-owner	Not stated	Male	Holstein-Jersey crossbred, Jersey	260	20
I_P4	Manager	Not stated	Male	Holstein	170	15
I_P5	Manager	Not stated	Male	Holstein, Jersey	200	10
I_P6	Manager	Not stated	Male	Holstein, Brown Swiss	100	15
I_P7	Owner	Not stated	Female	Holstein, Jersey, Brown Swiss	375	40
I_P8	Owner	Not stated	Female	Holstein, Jersey, Norwegian Red Cross	983	50
I_P9	Owner	Not stated	Female	Holstein	325	25
I_P10	Owner	Not stated	Male	Holstein	245	20
I_P11	Owner	Not stated	Female	Holstein	2400	250
I_P12	Owner	Not stated	Female	Holstein	690	75
I_P13	Manager	Not stated	Male	Holstein	1200	200
I_P14	Manager	Not stated	Male	Holstein	4000	450

*Age was only collected from focus group participants.

*Focus group participants 4 and 5 were from the same dairy farm, but both participants contributed to the discussion.

9 farms). The median (range) number of lactating and dry cows was 285 (85 to 1,050 cows), and the median (range) of pre-weaned calves being fed milk at the time of the interview was 32 (12 to 100 calves).

3.1.2 Interview participants

Fourteen semi-structured interviews were conducted with 15 participants (i.e., two farm representatives were present for one interview). Six producers described themselves as farm owners and nine as employees; one interview started with the farm owner who then deferred the interview to an employee more closely involved with newborn calf care. Of the 14 dairy producers in this study, two producers raised their own male calves (i.e., future sale for genetics, dairy beef) and purchased additional male calves intended for slaughter at 15-16 months of age. All participants were directly involved in newborn calf management. Seven participants were female and eight were male. Farms were in Ohio (n = 12) and Indiana (n = 2). The median (range) number of lactating and dry cows was 293 (65 to 4,000 cows), and the median (range) number of pre-weaned calves being fed milk at the time of the interview was 23 (8 to 450 calves). Breed demographics varied by farm; 50% (7/14) of producers milked only Holstein cattle, 7% (1/14) milked only Jersey cattle, and 43% (6/14) of producers had mixed herds containing a combination of Jersey, Holstein, Brown Swiss, and/or Holstein-Jersey crossbred cattle.

3.2 Differences in male and female care (interview participants)

3.2.1 Newborn care practices

A majority of producers in the present study discussed having different neonatal care practices for male and female calves (64%; 9/14 interview participants), but some producers reported consistent care practices, regardless of sex (36%; 5/14 interview participants). Some producers (29%; 4/14 interview participants) discussed having different colostrum management protocols for male relative to female calves. Many producers (79%; 11/14 interview participants) routinely provided disease prevention products (e.g., vaccinations, immune boosters) to female calves shortly after birth, but few producers (27%; 3/11 interview participants) provided the same products to male calves. Further, some lower-input practices that were relatively easy and inexpensive to administer were routinely given to all calves. For example, all the interview participants (100%; 14/14 interview participants) had similar navel care protocols for male and female calves.

3.2.2 Calf marketing

Most dairy producers (79%; 11/14 interview participants) sold their male calves within 7 d of age. Producer-reported male calf sale price at the time of this study varied between \$0 to \$175

per calf. Income received from the sale of male calves varied substantially by calf breed; smaller dairy breeds (e.g., purebred Jersey calves) sold for \$0 or yielded a bill requiring dairy producers to pay for the sale of their calves. Comparatively, calves with beef genetics sold for more than \$100 per calf.

Producers described using a single or combination of 4 different marketing routes for male calves. Male calves were either: 1) reared on the dairy farm of birth for later sale or slaughter for personal consumption (36%; 5/14 interview participants), 2) sold through a live auction soon after birth (50%; 7/14 interview participants), 3) sold to a member of the producer's local community (e.g., 4-H projects [community-based youth livestock shows], friends, or neighbors) (57%; 8/14 interview participants), or 4) sold to a third-party individual for veal or dairy beef (29%; 4/14 interview participants). Two interview participants exclusively raised male calves until slaughter at 15 to 16 months of age; 1 sold all male calves through a live auction; 3 sold all male calves directly to a third-party calf-purchaser; 1 sold all male calves directly to someone in their community; and 8 sold calves through a combination of the identified marketing routes.

3.3 Perspectives on male calf care and welfare (interview and focus group participants)

Thematic analysis of open-ended questions related to male calf care and welfare resulted in 3 major themes: 1) factors influencing male dairy calf care, 2) attitude toward male calf welfare, and 3) opportunities to improve male calf welfare.

3.3.1 Theme 1: Factors influencing male dairy calf care

3.3.1.1 Subtheme 1: Allocation of resources

Participants in the interviews and focus groups discussed various factors which attributed to the care they provided male dairy calves prior to sale. The time required to care for male dairy calves influenced the quality of care they received and influenced producers' decision to sell them as soon as possible. For example, one producer from the focus group stated, "It's the time [given to male calves] that's taking away from those valuable heifer calves" (FG_9). Another producer shared a similar sentiment, and said, "It's just to get them out of there, because I don't want to have to take the time [to care for male calves]. I mean, we're not going to get anything for them if we keep them and feed them for two weeks versus 'he's here for days'... Just my time or the expense of having to pay my employees to feed and take care of him, and we're not going to get anything out of him anyway" (I_P1). This producer went on to elaborate and explain why they typically market calves through live auctions, they noted, "We basically take them to the sale barn just to get rid of them quickly" (I_P1). This suggests that marketing calves at live

auctions may be used as an efficient way to remove male calves from the farm to limit time dedicated to managing male calves after birth.

The availability of other high-value resources (e.g., colostrum, available housing) was also considered an important factor influencing male calf care, and producers often prioritized more valuable resources to female calves. Two producers expanded on this in relation to differences in colostrum management among male and female calves on their farm: (I_P14), “We try to use better colostrum on our females, obviously because we are more interested in them,” (FG_P8) “You don’t have to be quite as careful [with the male calves].” Another producer (I_P8) also shared this perspective: “The heifers are the replacement of your herd. You’re going to take care of her. And the bull, not so much.” In addition, another producer (FG_P8) detailed marketing male calves with a sense of urgency due to infrastructure limitations and the perception of those resources being more important for female calves, and stated, “I try to get rid of my bull calves as soon as possible. I don’t have enough space for the heifers.”

In contrast, as not all producers had different neonatal care practices for male and female calves; results detailing consistencies between male and female care were also discussed. Two producers were seemingly intrinsically motivated to provide similar care to all calves: “As far as our farm goes, I don’t see how that’s going to give me any money to not take care of the bull calf just as well [as the female calf]. So that’s why. Well, the girl in me says, ‘There is no difference at this stage of the game. I’m giving it [the bull calf] just as good of a start as anybody’s going to get. I’m going to take care of it.’” (FG_P1) “I want to take good care of my bull calf ... it’s important, just as a humane practice.” The simplicity of having similar protocols for male and female calves was also noted, as one producer simply stated, “It’s just easier [to have the same calf care protocols]” (I_P10).

3.3.1.2 Subtheme 2: Calf marketing

Producers were generally reluctant to dedicate resources (e.g., money, time, etc.) to male calves when they received little compensation at the point of sale. For instance, one producer (I_P3) stated, “Obviously the more a bull calf is worth, the easier it is to justify treating it well, as terrible as that sounds.” Of the interview participants that sold their male calves, a majority said that calf sale price limited the care they provided to male calves. For instance, one producer stated, “I get \$0 for the ones at the sale barn, so I’m not going to put the money into them.” One producer (I_P9) who also purchased male dairy calves reflected on calf sale price, contrasting the current market to past years: “I got really good bull calves when they were worth \$400 to \$500 bucks a piece ... they were taken care of when they were worth a lot of money, but now that they’re not worth as much, it’s kind of they’re an afterthought.” Receiving what was perceived by producers as an inadequate price for calves marketed through live auction also

limited providing disease prevention products to male calves prior to sale. Another producer explained, “We don’t get paid enough to give vaccines to bulls” (I_P11). Comparatively, another producer suggested if they received more money for calf sales or were compensated for the additional care provided to male calves (e.g., disease prevention products), they would be willing to provide higher quality care after birth. For example, one producer stated, “We were selling some of these beef-crossed calves to an individual, and I asked him at that point, I said, ‘Do you want them to have First Defense [a supplement with antibodies to prevent scours]?’ And he’s like, ‘I’m not paying extra for it.’ Then, I’m not going to give it to him” (I_P2).

The producers in this study highlighted how calves were sold influenced the care provided to male calves prior to sale. Of the four marketing routes identified, calves raised on the dairy farm of birth or sold to someone in the producers’ local community generally received higher quality care, compared to calves sold to a live auction or a veal or dairy beef facility. For example, one producer (I_P9) who reared male calves until slaughter at 15 to 16 months of age reported rearing male and female calves using the same protocols because, “My theory is [if] everything gets treated the same, we’ll be better off.” Another producer that utilized more than one marketing route discussed differences in male calf care, depending on if calves are sold to individuals within their community or through a live auction: “They’re [calves sold to a neighbor] different from the ones going to sale. I’ll just make sure they [calves sold to a live auction] get the colostrum, and I mean that’s about it. Because like I said, I don’t get anything for them, so there’s no point putting money in them” (I_P1).

Differences in neonatal care practices relative to marketing may be due in part to the producers’ relationship with the calf purchaser, and the purchaser’s willingness to pay more for calves that received higher quality care. For instance, as one producer that sold male calves to individuals in their local community explained, “The beef cross ones, actually the last while I’ve been able to sell most of them privately to neighbors ... the neighbors are willing to pay because that includes colostrum and vaccines” (I_P3). Frequent interactions between another dairy producer (FG_P2) and their calf purchaser also seemingly improved their male calf care: “The guy we sold our Angus to, he told us, I want these calves to get this. If it’s possible for you, I’d be willing to split the cost with you in doing it. Ever since he said that ... before, we just treat them like a regular bull. Then he brought it up, we’re like you pay us decent money for them. We don’t want to lose that kind of business.”

A feeling of personal responsibility to individuals in their local community or someone they reported having a relationship with also impacted producers’ willingness to provide higher-quality care to male calves. For example, one producer stated, “There’s a guy that comes here, he raises like three, four bull calves a year. And I usually vaccinate them for him before they leave the farm ... We wouldn’t do that to calves going to the auction. But

somebody's taking them back to their farm that's going to raise them, I do that for them. Keep them healthy" (I_P10). Another dairy producer who also sold their male calves to someone in their local community treated male and female calves according to consistent protocols and explained, "They're treated just like a heifer would be here, and I know that the home they go to, they're taken wonderful care of there" (I_P8).

A lack of awareness regarding calf destination may have also affected how calves were treated before leaving the dairy. For example, "Really, if we knew that they [male dairy calves] were going to true veal ["formula-fed" veal slaughtered at 23 weeks of age], then we could give them these vaccines to keep them healthier. But if they're going to "bob" veal ... we have no clue if they're going to that. So, then we can't give them anything, and it's tough" (I_P6). Another producer (I_P10) explained, "I've been told that most bull calves go for "bob" veal [slaughtered at less than 3 weeks of age or 150 lbs] ... I would prefer if we could vaccinate a calf before it goes to sale and they didn't go for "bob" veal. But, if that's the case, then you're not able to do anything to help boost the immunity before he goes to the sale". Multiple vaccines and disease treatment products for calves have a meat withdrawal period up to or greater than 21 d, thereby precluding bob veal calves from treatment (NMPH, 2009). The assumption calves are slaughtered for bob veal highlights these producers may be unaware of the next production phase their calves enter after leaving the dairy.

3.3.1.3 Subtheme 3: Accountability for future calf health

Some producers expressed that limited accountability for the future calf health of male calves played a role in deciding what preventative health measures were implemented. Selling male calves from the dairy farm soon after birth may negate the personal responsibility some producers experience to ensure calf health. For instance, one producer (I_P2) noted: "We're really just looking at how healthy the calf looks that day ... There are a number of things [health concerns] that don't pop up until they're two or three weeks old." Another producer (FG_P1) described discrepancies among male and female calves and the provision of water, and clarified, "No, because the bulls aren't here long enough to really benefit from it [water]." When asked if male calves receive the same disease prevention products as female calves, another producer (I_P11) stated, "Bulls are only here for a couple of days, so we don't really see that [disease] too often. If there's anything to happen to the bull calves that would happen when they're off the farm ... So, it doesn't make sense for us to give those bull calves a vaccine if they are going to be gone within a couple of days." Another producer shared a similar sentiment, as male calves may not be on farm long enough to show a response to farm specific pathogens: "We don't keep them [male calves] and they're not on our farm with our diseases because that's what we vaccinate for" (I_P6). However, another producer (FG_P8) referenced their accountability for calf health and willingness to

provide disease prevention products to male calves in the event male calves have to remain on their farm for a longer period: "I'll even use First Defense on a bull calf if I can't get rid of him right away. I don't want to have to treat that bull calf for E. coli and then he can't leave. So, I give him the First Defense and that keeps him from having this two-day-old scours that to me, is directly impactful."

3.3.2 Theme 2: Attitude toward male calf welfare

3.3.2.1 Subtheme 1: Indifference toward male calf welfare

Some producers discussed male calf welfare with indifference because male calves did not add value to their dairy operation. For instance, one producer (FG_P3) that was unaware of male calf destination commented, "I don't know. It's their 'problem' then." Another simply stated, "You know to be honest with you, I don't really care." This producer was asked to elaborate and explained their indifference stemmed from little to no monetary income generated from male calves. They further explained their statement, saying, "I don't care. You know, I'm not going to get much for you [male calf] anyway. So, you're just going to go to the sale barn. Now, if you're keeping them and raising them because you got the facility to keep them raise them for beef or whatever, then probably I would assume I mean, personally, I would take care of them. If I knew I was going to get something out of them" (I_P1). Interestingly, one producer (I_P9) referred to marketing male calves as "a game," and stated, "I mean it's a game. That's that. We were told, when we first started in sale barn calves, this guy that we broker the fat cattle through, he just said, 'It's a game, and you better be willing to play the game.' ... Everybody's just in it to make a buck." However, perceptions of indifference towards male calves did not necessarily influence the quality-of-care producers provided to calves. For example, another producer (I_P6) described male calves as "useless," but still discussed a sense of moral obligation to care for them. For instance, this producer explained, "[Male calves] are neglected, for sure ... They're pretty much useless on the farm. Yeah. So, we don't want to take care of them, but we do the right thing and we do take care of them."

3.3.2.2 Subtheme 2: Concern for male calf welfare

Other dairy producers expressed concern for male calf welfare, even when they directly acknowledged providing different care to males and females. For instance, one producer discussed an ethical dilemma of providing higher quality care to female compared to male calves, and explained, "We're withholding things that we know work with our heifers because it's low value to us. It's a matter of, where do you draw that line? It's as simple as giving them two quarts as opposed to our Holsteins getting three quarts, because we're giving preferential treatment to those heifers" (I_P2). Interestingly, another dairy producer (I_P9) who reared male calves shared a statement of

the dairy industry as a whole and stated, “Bull calves kind of get kicked under the rug, and yeah, it’s frustrating. I don’t think they get the colostrum. That’s not so much the vaccines. I mean they would help, but the colostrum I think is the biggest thing that I don’t, I mean I can’t prove it, but I would say that 90% of the problems that I deal with sale barn calves is because they didn’t get enough colostrum ... I think the other part is the stress on the trailer.”

Producers also shared concerns relating to the care calves may receive after leaving the dairy, including calves being directly slaughtered for “bob” veal (i.e., slaughtered < 3 weeks of age). For example, one producer (I_P2) shared, “How is that calf being treated when everybody’s got the mindset of, ‘Oh, he’ll be dead in a day. I’m guilty of sending a calf that’s got a little bit of a limp to it. The question is whether, is it worse sending that calf to be slaughtered tomorrow.” Another producer (I_P10) shared a similar concern that calves may be treated poorly after leaving the dairy, “I have to wonder once they go to sale too, are they getting fed? I doubt it. I really don’t like the sale barn.”

3.3.3 Theme 3: Opportunities to improve male calf welfare

Several producers had suggestions for how to improve the care and welfare of male calves. For example, many participants recommended increasing the sale price of surplus calves. One producer (I_P3) estimated the cost per calf that would be necessary to provide higher quality care to male calves: “I need about \$40 to cover the colostrum and the vaccine that I give my heifer calves ... Then, there’s probably an hour of time that you could save by doing the bare minimum versus a full treatment like I do my heifer calves. So probably \$60 [extra] to make a profit on your time and your stuff you bought would probably be kind of the bare minimum.” Specialized markets for dairy beef calves were discussed by many producers as a strategy to improve calf sale price. For instance, one producer (I_P1) stated, “Look at the way Angus has their Certified Angus Beef thing now and how that has just taken off. It’s like that would be awesome if something like that could happen for Jerseys and Jersey beef.” Another producer (FG_P1) directly commented on their decision to utilize crossbreeding in their herd: “I don’t like shipping them off and not knowing where they’re going and not having a market for my Jerseys. We have none ... Nobody wants them. So, what do you do? We try crossbreeding. We do genomic testing.” Similarly, other producers discussed possible benefits of crossbreeding and improved calf welfare outcomes: (FG_P2) “Our Angus get better colostrum [compared to purebred Holstein male calves].” Moreover, I_P2 stated, “As we get into these beef-crossed calves, I think we’re going to get to a point where it’s going to be such an income stream for the dairymen that they’re not going to want to lose one of those calves. I think if anything, that’s going to help the welfare of those calves.”

Participation in animal welfare or other industry programs was also discussed as a strategy to improve male calf welfare. For

example, one producer stated, “If you can set up some program where we’ve inspected the farms that these calves came from, doing these certain things to these bull calves, and this is what you can expect buying these calves...” (I_P2). Another producer (I_P1) also recommended involvement in animal welfare programs as a suggestion to improve calf welfare because “you have all their requirements that you have to go by.” Yet, one producer (I_P9) described experiences with other producers, discussing a general reluctance among some to adopt new practices: “As a farmer, you have to be willing to talk to people and to admit that you’re wrong and be willing to change ... At least around here, that is a big problem, and I don’t think it’s just around here.” Possible regulatory action was also perceived negatively by some; for instance, one producer (I_P3) discussed calf age at transport in reference to recent changes to federal transportation regulations in Canada and stated “[The new regulations] pretty much ruined selling bull calves for certain areas of the province. I hope we don’t ever do anything that dumb.”

4 Discussion

This study used focus groups and individual interviews with dairy producers to describe self-reported care practices for male and female calves, as well as their perceptions toward male calf care and welfare. Dairy producers reported that some neonatal calf care practices of low monetary cost, such as navel antisepsis, were similar among males and females, but high-value resources (e.g., colostrum, disease prevention products) were commonly provided to female but not male calves. For producers with discrepant calf care practices, little monetary income from calf sales, marketing routes, and lack of accountability for future calf health were factors that affected male calf care. Producers provided a higher level of care to male calves if they had a relationship with a calf purchaser (i.e., an individual in their community), with many male calf care practices dependent on the marketing route. There was divergence in concern about male calf welfare after being sold from the dairy, with some producers expressing concern and others indifference.

Some neonatal care practices, such as colostrum management and administration of disease prevention products, differed among male and female calves, with male calves receiving suboptimal care. This finding of suboptimal care for male dairy calves in the present study is consistent with findings from [Wilson et al. \(2021\)](#) that found Canadian dairy producers tended to prioritize the care of female over male calves. Similarly, producers in the Canada and the U.S. do not always provide colostrum to male calves, even when it is common practice for female calves ([Renaud et al., 2017](#); [Shivley et al., 2019](#)). [Shivley et al. \(2019\)](#) also reported male calves were fed a lower total volume of colostrum, delayed colostrum feedings, and left to suckle colostrum from the dam

more frequently than female calves, which is similar to producer reports in this study.

Of the producers who sold their male calves, all but one producer sold them within the first week of life. Producers reportedly sold male calves as soon as the navel was dry to be compliant with state regulations (e.g., [Ohio Department of Agriculture \(ODA\), 2009](#)). Selling calves as neonates creates considerable animal welfare concerns related to the stress and pathogen exposure associated with marketing through livestock markets, long-distance transportation, and commingling with unfamiliar animals (reviewed by [Creutzinger et al., 2021](#)). Increasing the amount of time male calves spend on the dairy farm after birth may improve calf care prior to marketing in an effort to keep calves saleable ([Wilson et al., 2021](#)).

We found calf sale price was a significant influencer of neonatal male dairy calf care. Male calf sales generate minimal income for dairy producers compared to female calves or future replacements for the lactating herd. Thus, it is not surprising that producers generally prioritized important resources (e.g., colostrum, time, other high-value resources) to female calves, as they generate a greater return on investment. Multiple economic strategies have been considered as a means to motivate improved care for dairy animals, such as financial penalties ([Valeeva et al., 2007](#)), monetary incentives ([Belage et al., 2019](#)), or providing a consistent, baseline price for calf sales ([Wilson et al., 2021](#)).

Another strategy to improve male calf care may be to strengthen the relationship between those selling (i.e., dairy producers) and purchasing calves (e.g., individual owners or employees of live auctions or buying stations, veal and/or dairy beef growers). In the present study, producers stated they would be willing to provide higher-quality care, such as colostrum or disease prevention products, to male calves if the calf purchaser was willing to pay more to offset this incurred cost. Further, we found male calves sold to someone in the producers' local community or raised on the dairy farm of birth received higher-quality care (e.g., more or higher quality colostrum, disease prevention products) than calves sold at live auctions or to calf raisers. Reasons for providing different standards of care varied by marketing route but included the calf purchaser's willingness to pay for higher quality care and a desire to keep calves healthy for purchasers within the producer's community. Calf raisers incurring the cost for higher quality treatment of calves on the dairy farm may also improve male calf welfare after arrival to calf-raising facilities by reducing the incidence of disease, and calf raisers might recover this cost with increased productivity and reduced use of antimicrobials throughout the growing period.

Since producers seem more conscientious selling calves to individuals within their community, it might be possible to use the idea of community to increase the value of the calves. These findings are similar to [Wilson et al. \(2021\)](#), which found Canadian dairy producers provided better quality care to male

calves when they had a personal relationship with the calf purchaser, so as to maintain a positive relationship. Ultimately, bridging the gap between dairy producers and calf purchasers will likely improve male calf care on the dairy farm of birth through improved communication between stakeholders and increased accountability for future calf health amongst dairy producers.

Early life sale of male dairy calves contributed to dairy producers' lack of accountability for future calf health, which was identified as a factor that influenced the care of newborn male calves. Male calves generally spent less than one week on the dairy farm of birth before being sold. Diseases, such as diarrhea and bovine respiratory disease, generally do not appear until approximately 1 to 2 weeks of age and greater than 4 weeks of age, respectively ([Urie et al., 2018](#)), which is after the time calves are sold from the dairy farm. By selling calves from the farm before the onset of these common calf diseases, it may negate the producers' responsibility to administer therapeutics to sick calves and the potential negative effects on herd health. Comparatively, in Canada, calves marketed through livestock markets are required to stay on the dairy farm of birth until 9 days of age, which seemingly improved newborn care, as producers wanted to keep calves healthy and saleable ([Wilson et al., 2021](#)). The dairy producers in this study that reared male calves until slaughter at approximately 15 to 16 months of age followed consistent protocols between male and female calves to keep all calves healthy, regardless of sex. Therefore, improving producer accountability for future calf health may lead to improved newborn management and beyond for male calves.

As part of the interview, dairy producers were asked how they perceived the welfare of male dairy calves, and some felt indifferent towards their welfare. This lack of concern seemingly stemmed from little to no monetary profit reportedly gained by producers from male calf sales. Interestingly, similar feelings towards male calves were found in a survey of Irish dairy producers; [Maher et al. \(2021\)](#) found that when given the opportunity to discuss calf welfare, some producers felt as though male calves were "worthless" and a "by-product of dairying," but others felt as though male calves should be provided a high level of care, regardless of value, similar to the range of reports in this study. Producer attitudes towards agricultural animals have an important relationship with animal care. For example, dairy producers in England described that female calf care is generally marginalized on dairies; however, producers were more likely to value female calves if they were viewed as important to the overall milking herd ([Palczynski et al., 2022](#)). Thus, to improve male calf care prior to sale, it would likely be beneficial if dairy producers perceived them to be valuable to their own farm and the overall dairy industry.

Some dairy producers also relayed concern for the welfare of male calves after being sold from the dairy farm, yet openly discussed making conscious decisions to provide their male

calves less than optimal care. Specific examples included providing lower quality and quantity of colostrum, withholding disease prevention products, and sometimes selling calves when they are unfit for transport (i.e., limping). A divergence between an individual's actions and personal attitudes or beliefs is not uncommon, even relating to animal welfare in the dairy industry. For example, [Huxley and Why \(2006\)](#) found that when veterinarians were interviewed on their perception of pain, nearly all reported that surgical horn removal was painful for young calves and provided pain relief (i.e., local anesthetic) during the procedure; however, few provided long-acting therapies (i.e., NSAIDs) to mitigate pain after the procedure. Clearly, here, these two modes of thought contradict one another, potentially inducing a state of discomfort that may complicate a decision-making process. This divergence, referred to as cognitive dissonance, occurs in situations in which an individual (e.g., dairy producer, veterinarian, etc.) perceives contradictory information regarding their actions, feelings, values, and/or beliefs ([Kristensen and Jakobsen, 2011](#)). It is clear from our work that dairy producers' experience cognitive dissonance relating to male calves, as they relayed their awareness of the importance of newborn care to future calf welfare, yet they reportedly provide male calves with substandard care. Thus, we encourage future research efforts to understand the fundamental relationships between dairy producers' values, behavior, and perception of risk (i.e., not providing high quality newborn care to male calves), to understand how to influence producers' decision-making process in ways that will improve newborn management and calf welfare.

To combat low calf sale price, multiple dairy producers recommended the development of "alternative" markets for male calves. For instance, the use of beef genetics in dairy cattle is a growing sector for male dairy calves. The number of crossbred dairy beef calves in the United States has increased almost 10% in the last 4 years ([Schaefer, 2021](#)) and often yield greater income to producers than purebred dairy calves ([Buczinski et al., 2021](#)). In addition to beef genetics, the use of sexed semen could benefit male calf welfare by reducing the production of undesired male calves ([Holden and Butler, 2018](#)). Additionally, animal welfare labeling programs may offer an opportunity for producers to highlight high-quality care provided to all dairy calves, regardless of sex, while receiving more income from calf sales through enrollment in animal welfare audit and assessment programs. Over 75% of American survey respondents valued animal welfare assessments carried out by independent auditors, and most respondents were reportedly willing to pay extra for foods marketed with such certifications ([Spain et al., 2018](#)). Similar willingness to pay for welfare-friendly products was reported from European, Asian, and Latin American consumers ([Miranda-de la Lama et al., 2017](#); [Sonoda et al., 2018](#); [Lund et al., 2021](#)). We suggest increased collaboration between

professionals in the dairy and male calf production sectors to develop and implement "value-added" programs, as they may improve animal welfare, consumer perception, and increase profitability. Further, more qualitative research is needed to understand the attitudes of dairy industry representatives (e.g., producers, calf raisers, quality assurance program representatives) and public stakeholders on male calves to achieve better welfare outcomes for these animals.

4.1 Limitations

There are potential limitations of this study, including participant recruitment methodologies and the use of Zoom interviews. Participants in this study were initially invited to participate through their herd veterinarian; producers having an existing, positive relationship with a veterinarian might represent more progressive dairy operations. Further, multiple producers with the same veterinarian may have received similar advice on best management practices, which could have affected their calf care practices ([Sumner et al., 2020](#)) and attitudes toward calves. It is also important to consider the effect of contextual factors (e.g., economic status of the dairy industry, SARS-CoV-2 pandemic, etc.) on producer actions and attitudes before generalizing these results. The convenience sample of dairy producers in the Midwestern region is an additional limitation of participant recruitment. Results from this study are not generalizable to all dairy producers, and only reflect the practices and viewpoints of the dairy producers in the sample at the time of the focus group and individual interviews. The one-on-one interview format between the facilitators and dairy producers may have stifled the conversation and possibly limited the depth of data, compared to an in-person focus group. Focus groups are commonly used to stimulate discussion among participants and different points of view ([Krueger and Casey, 2009](#)), and the online format of individual interviews may be a limitation of this study because of a lack of interpersonal connection that possibly stifled conversation beyond the discussion guide questions.

5 Conclusion

Some dairy producers in this study reported providing substandard care for male relative to female calves, with higher-value resources (e.g., colostrum, disease prevention products, time) prioritized to female calves. Several factors influenced male calf care, including calf sale price, marketing route, and accountability for future calf health. Producer perceptions of male calf welfare ranged from indifference to concern for male calves; indifference towards male calf welfare was often discussed in relation to calf care on the

dairy farm, whereas concern was often discussed in terms of calf care after sale. Niche markets or participation in value-added programs (e.g., breed specific branding, animal welfare programs) were suggested by dairy producers to improve male calf value and welfare. Collectively, these results suggest opportunity for improved newborn male dairy calf care. Although farm-level interventions are likely complex and multivariate, the feelings expressed by producers that providing high quality care to male calves is not affordable may suggest that external support is needed to help dairy producers make proactive improvements in male calf care.

Data availability statement

The datasets presented in this article are not readily available because in the interest of protecting individual anonymity. Requests to access the datasets should be directed to habing.4@osu.edu.

Ethics statement

This study was approved by The Ohio State University Institutional Review Board (Focus group: IRB2020E0038; Interviews: IRB2020E0400).

Author contributions

The focus group was conducted by JP and KG. KC, SL, and JP conducted the interviews and performed the analysis. The analysis was guided by KG. All authors contributed to the design of the interview guide(s), contributed to the data analysis, manuscript writing and revision, and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fanim.2022.1000897/full#supplementary-material>

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