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Consumers' attitudes about milk quality and fertilization methods in dairy cows in Germany

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ABSTRACT

Major advances in assisted reproductive technologies have improved reproductive efficiency in dairy cattle. However, these developments occurred regardless of the perception of consumers, who often distrust biotechnology in food production. Therefore, the objective of this study was to investigate consumers' attitudes toward reproductive management practices in dairy cattle. In November 2012, 1,646 participants were interviewed by a commercial market research institute. Participants were selected from all regions and demographic categories to represent the general public in Germany. Seven questions regarding milk-drinking preferences and reproductive technologies were asked in face-to-face interviews. Descriptive statistics and multivariable logistic regression models were used. The majority of people drank milk at least weekly (63%) and found the taste of milk important (60%). Most people perceived advanced reproductive technologies negatively [e.g., the use of sexed semen (53%), embryo transfer (58%), cloning (81%), and hormone treatments to increase fertility (65%)]. Many people lacked basic knowledge about milk production (22% did not know that cows only give milk after calving; 51% did not know that milk naturally contains hormones); however, participants with a high school education, older participants, and those who had concerned themselves with dairy farming were more knowledgeable. Education and providing information might help to inform the public about reproductive management practices in dairy cows.
Key words: consumer attitude, consumer knowledge, reproductive technology, milk quality

INTRODUCTION

A wide variety of methods, tools, and management practices have been developed to ensure or improve fertility of individual dairy cows and reproductive performance of animal populations in the past century. The development of assisted reproductive technologies in dairy cattle has been extensively reviewed (Foote, 2002; Moore and Thatcher, 2006). These methods include AI, endocrinological approaches (e.g., hormone therapy, synchronization protocols), embryo transfer, in vitro embryo production, use of sexed semen, cloning, and preimplantation diagnostic screening techniques. Their developments have been driven by different objectives, such as controlling venereal diseases (Foote, 2002), increasing genetic merit (Moore and Thatcher, 2006), increasing labor efficiency (Tenhagen et al., 2004), or facilitating insemination of cows at a predictable time relative to ovulation without estrus detection (e.g., Pursley et al., 1995; Rabiee et al.,2005). These technologies led to enormous increases in milk production but were accompanied by a decline in reproductive efficiency in high-producing cows worldwide (e.g., Lucy, 2001). Although high milk production and good reproductive performance are not mutually exclusive, this decline in fertility has likely perpetuated more research and development of new reproductive technologies that are widely applied in the dairy industry (von Keyserlingk et al., 2013).

Today, hormonal synchronization protocols have been widely adopted (Fricke et al., 2014) and the dairy industry relies heavily on the use of exogenous hormones to mitigate challenges associated with low fertility (Moore and Thatcher, 2006). Timed AI protocols to manage reproductive performance of at least some of the heifers or cows were used by 58% of all US dairy farms in 2007 (USDA, 2009). Although negative pharmacological effects on animal or human health have not yet been described, it has been speculated that few consumers are aware of such reproductive management practices (von Keyserlingk et al., 2013), and that consumers would likely perceive this type of assisted reproductive techniques to be unnatural and unwelcome (Boogaard et al., 2011).

Public perception of milk products arising from the introduction of new technologies is difficult to assess

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(von Keyserlingk et al., 2013). In general, the public frequently distrusts the use of biotechnology in food production (Gaskell et al., 2000; Lassen et al., 2006). More specifically, the public perceives hormones undesirably as the word "hormones" holds negative connotations in the context of food production (Higgins et al., 2013; Jung et al., 2015). The potential impact of consumer perceptions regarding these techniques and hormone use in reproductive management programs should not be underestimated and will likely play a significant role in determining future management practices (von Keyserlingk and Heuwieser, 2008). A negative consumer attitude could eventually result in image problems for the dairy industry. In addition to hormone use, there is a lack of information on how the public perceives practices or reproductive methods applied in the dairy industry today.

Consumers' attitudes about food might be associated with their knowledge about the industry (Hallman et al., 2003). Factors influencing knowledge and attitudes about food might include age (Verbeke and Viaene, 1999; Hallman et al., 2003; Worsley et al., 2013), sex (Rozin et al., 1999; Verbeke and Viaene, 1999; Hallman et al., 2003), education (Hallman et al., 2003; Worsley et al., 2013), place of residence (urban or rural; Weatherell et al., 2003), and whether or not the consumer has children (Schröck, 2014). Furthermore, whether or not the consumer knows a producer personally might also influence the attitude (Institute for Demoscopy Allensbach, 2002). Due to the different structures of the dairy industry in southern, western, and eastern Germany, with fewer, larger farms in eastern Germany and more numerous, smaller farms in southern and western Germany (Statistisches Bundesamt, 2013), one might speculate that consumers in eastern Germany less often know a farmer personally (Institute for Demoscopy Allensbach, 2002) and, therefore, have a more negative attitude toward the dairy industry.

Therefore, the objective of this study was to benchmark consumers in Germany regarding their attitudes about certain reproductive management practices in dairy cattle. Specifically, we set out to (1) evaluate consumers' knowledge and perceptions about reproductive methods in modern dairy farming, and (2) determine potential associations between consumers' demographic characteristics and knowledge about dairy farming.

MATERIALS AND METHODS

Questionnaire

Between November 10 and November 22, 2012, a commercial market research institute (Institute for Demoscopy Allensbach, Allensbach, Germany) conducted a survey on behalf of the Clinic of Animal Reproduction, Freie Universität Berlin (Berlin, Germany). Participants were selected from all regions in Germany and had to be 16 yr of age or older. Participants were recruited personally (friends or relatives) by 467 interviewers and were selected based on quotas to represent proportions similar to census distributions (Statistisches Bundesamt, 2011) in terms of demographic data; that is, region, state, size of residence, sex, age, occupation, type of occupation, marital status, and size of household. The interviews were usually conducted in the participants' homes and no incentive was provided for participation. The interviewers themselves were also selected to represent the desired regional distribution.

The questions for this study (n = 7) were part of a multi-topic questionnaire (Hauptbefragung 11001 November/December 2012) containing 70 questions. The time required to complete the questionnaire in a face-to-face interview was about 50 min. The time required to complete the 7 questions related to this study was not separately recorded. Before the study questions, the topics of insurance companies and driving habits were investigated for other purposes. The questions were developed by questionnaire specialists from the Allensbach Institute and were pretested for comprehension and technical functionality. The interviewers were instructed to read the questions aloud and always ask the questions in the same order. Technical help was provided to the interviewee if necessary (Appendix Table A1).

Statistical Analysis

Frequency distributions over all categorical variables were calculated to describe the data. Sampling was disproportionally higher in eastern states by approximately one-third more than would be representative for the proportion of inhabitants (19%). This disproportionality was accounted for using weighted analysis. States were categorized into the following regions: south (Bavaria and Baden-Württemberg), west (North Rhine-Westphalia, Rhineland-Palatinate, Saarland, Hesse, Bremen, Hamburg, Lower Saxony, and Schleswig-Holstein), and east (Berlin, Brandenburg, Saxony, Saxony-Anhalt, Thuringia, and Mecklenburg-Western Pomerania). Multivariable logistic regression models were built for 2 questions: (a) "A cow can only give milk when she already gave birth to a calf. Have you heard about that or have you not heard about that but you would have expected it or you would have not necessarily thought that?" and (b) "The milk that comes from healthy cows that did not receive