

DAIRY VETERINARY NEWSLETTER

July 2014

Do Cows Pregnant With Heifer Calves Produce More Milk Than Those Carrying Bulls?

An interesting paper on a practical subject which has not received much attention appeared recently in an on-line electronic journal. The Feb. 3, 2014 paper was in PLoS One by Hinde et al. Studies of milk production in relation to the sex of the fetus that was carried by the mother have been done in several species of animals as well as in humans. In many species, mothers produce more milk if they have carried sons than daughters. In addition, milk production sometimes has been found higher for mothers of one fetal sex in early lactation, but the trend has reversed during peak lactation, and sometimes daughters received more milk than sons, but of lower milk fat and other nutritional density. As one might imagine, data collection and sample size have been a challenge in many of these studies, such as on primates, deer, and rodents.

Milk production data and records of the sex of the fetus born are relatively abundant in the Holstein dairy industry, however. The authors studied data from DHIA records from 1995 to 1999. At first I was surprised by this somewhat older data set, but the authors had a good reason for this I think. They wanted to study data before the widespread use of sexed semen, in case there was a bias that cows chosen to receive semen likely to produce heifer calves might also be cows having already demonstrated higher milk production. This data also included records of whether or not rBST was administered during each lactation.

Records for breed other than Holstein, twins born, abortions, missing data, duplicate records, or 6th plus lactation were excluded. 2.39 million lactation records from 1.49 million cattle were studied. Milk production was age, season, and fat corrected, and also adjusted for year, rBST, and repeated lactations within the same cow. There was also a separate analysis excluding cases of rBST administration, or any degree of dystocia to rule out the effects of increased probability of dystocia associated with larger bull calves.

Cows carrying daughters and not administered rBST produced more milk than those carrying sons

First calf heifers not administered rBST that bore daughters produced 313 lb more milk per 305 d (P < 0.001) than those that had bull calves. Older cows also produced more milk after calving with heifer calves, but the effect was smaller. Overall, cows pregnant with heifer calves produced 208 lb more milk per 305 d

(P <0.001) than those with bull calves if not administered rBST.

The effect of sex of fetus on milk production was reduced with administration of rBST

Cows administered rBST produced 2181 lb (12%) more milk per 305 d than those without exogenous BST. Administration of rBST was associated with smaller effect of fetal sex on milk production. First calf heifers administered rBST that bore daughters produced 110 lb more milk per 305 d (P <0.05) than those that had bull calves. All cows pregnant with heifer calves produced 64 lb more milk than those with bulls per 305 d (P <0.001), if they all received rBST. Milk fat and protein percentages were not different, 3.61% and 3.62% fat, 3.17% and 3.17% protein produced by cows carrying daughters and sons, respectively.

Adjusting for effects of dystocia

As expected, bull calves were more associated with dystocia than heifer calves, 5.6% vs. 4.2% (P <0.001). Therefore, all calvings with dystocia were removed for a subsequent analysis. Results did not change much. For example, first calf heifers not administered rBST and without any dystocia produced 284 lb more milk per 305 d (P <0.001) than those that had bull calves. Thus, 91% of the increased milk production associated with bearing a female fetus was not associated with dystocia.

Influence of fetal sex during each of a cow's first two pregnancies

I found this part interesting. For only the first and second pregnancies of a cow's life, the authors studied cows with no rBST or dystocia (n = 113,750 lactations). 28% of cows had son/son in their first two pregnancies, while only 23% had daughter/daughter. Even though this was before adoption of sexed semen, the proportions surprised me. This study was not designed to attempt to explain why. Cows that had son/son produced significantly less milk than all other cows, and cows that had son/daughter produced more milk than the cows with two sons, but were still significantly less than cows with daughter/son or daughter/daughter. The latter two groups, cows with daughter/son or daughter/daughter, produced the same amount of milk, differing by only 31 lb per 305 d, but out-producing the other two groups who did not have a daughter during their first pregnancy. All data can be seen in the paper (see below).

Despite statistical significance, how important is the milk production difference?

The authors mention the possibility that 90% successful sorting of semen to produce female calves now exists, and that one benefit of producing more heifer calves may be increased production by their mothers. This is a practical point. However, this paper is a classic example of how very large sample sizes can produce statistical significance when numerical, biological, and financial effects may be small. The milk production differences reported, if they still exist at present, would account for 0.3% to 1.4% of a 22,600 lb/305 d lactation, approximately Utah state average so far in 2014. Using the June 2014 USDA Utah milk price of \$23.40/cwt, the gross value of the increased milk from mothers of heifer calves is worth \$14.98 (64 lb) to \$73.24 (313 lb) per lactation. This is probably not a major consideration in whether dairy producers elect to use sexed semen or not. However, it is good to know that apparently heifer calves, already highly desired, also bring an advantage in the form of higher milk production by their mothers.

The entire paper can be viewed at:

<http://www.plosone.org/article/fetchObject.action?uri=info%3Adoi%2F10.1371%2Fjournal.pone.0086169&representation=PDF>

Drug Residues in Milk Decrease - 99.98% of Residue Tested Milk Samples Were Negative

The FDA has published the annual report of milk residue tests for animal drugs for 2013. This is not to be confused with the FDA sampling of 1800 bulk tank milk samples for additional testing that took place more than a year ago. It was summarized in a Dairy Herd Management article by Dave Natzke, which also includes a link to the entire report. The report is actually the report by the National Milk Drug Residue Database (NMDRD), a voluntary reporting program comprising nearly all milk plants in the U.S.

The article states, “Of the nearly 3.76 million milk samples tested for animal drug residues last year, only 731 tested positive for drug residues. [This means that 99.98% of residue tested milk samples were negative.]

- 0.014% of all truckloads of raw milk (445 out of 3.19 million) tested positive for - - drug residues in fiscal year 2013, down from 0.017% in fiscal year 2012
- Of 467,429 samples of producer milk - - from a bulk tank/silo [on] a dairy farm, 281 (0.06%) tested positive, resulting in the disposal of 339,000 lbs. of milk
- Of 55,408 samples of milk from plant tanks/silos and milk transporters, 5 (0.001%) tested positive for a drug residue, resulting in the disposal of 240,000 lbs. of milk
- Of 40,435 samples of packaged milk products tested after pasteurization, none tested positive”

It is certainly great news that finished dairy product testing did not detect any residues. I think the 0.06% positive percentage for tanks on farms is actually an increase from several years ago. (In the full report, it actually shows one more truckload and one more producer milk sample positive than the above, which may have come from the same incident, and was in the final edited version only.)

It was interesting to me that over 3.6 million residue tests, 95.7% of all tests, were performed on “industry samples”, those collected by milk buyers and processors at plants and transfer stations. Accordingly, 679/733 (92.6%) positive tests were from industry testing, and only 7.4% were from “regulatory samples”, collected by “Regulatory Agencies”.

A breakdown by family/drug tested shows that 90% of all residue tests were for beta-lactams, and 97% of all residues detected were beta-lactams. 5% of tests and 1% of residues were for sulfonamides, and 4.5% of tests and 2% of residues were for tetracyclines. (A small number of other drug class tests were also performed.) This is the first data I recall where the percentage of residues was not higher when drugs other than beta-lactams were tested for. There used to be a mindset by a minority, but clearly present, group of dairy producers that use of drugs other than beta-lactams was a way to avoid residue detection. Many milk plant personnel have told me up until a couple of years ago that “when we pull out the tetracycline or sulfa kits, there are more positive tanks on those days”. Now nearly all producers appear to realize that observations of withdrawal times and sometimes on-farm testing for drugs besides beta-lactams are necessary practices.

Some particular drug test kits were more likely to have positive results

There were 26 different test kits used, the vast majority being some kind of Charm tests, with most of the rest being SNAP or Delvotest kits. There were two test kits associated with a higher percentage of positive

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results than any other tests, the Charm BSDA Tablet - Beta lactams (0.070% positive), and the Delvotest P 5 Pack - Beta lactams (0.054% positive). There is a notation that “NCIMS evaluated these kits for detection of beta lactams; however, unless the kits are used with beta lactamase, they do not specifically identify the presence of beta lactams”. These are both tests for inhibition of growth of *Bacillus stearothermophilus*. The note adds that these tests are, “ - - sensitive [to] including, but not limited to, antibiotics or non-specific inhibitors such as sanitizers.”

The article including the link to the full report can be viewed at:

http://www.dairyherd.com/e-newsletters/dairy-daily/Drug-residues-in-raw-milk-samples-decline-again-246981231.html?utm_source=7344I2946023B7R&utm_medium=eNL&utm_campaign=Dairy+Herd+Network+Daily_20140225&utm_term=milk+quality&utm_content=Edit

Please let us know your comments and also suggestions for future topics. I can be reached at (435) 760-3731 (Cell), (435) 797-1899 M-Tues, (435) 797-7120 W-F or David.Wilson@usu.edu.



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