

## Meeting the Demand for Dairy Replacements

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### Panelists

Douglas Maddox, RuAnn Dairy and Maddox Dairy, Riverdale, California  
John Noble, Noblehurst Farms, Inc., Pavilion, New York

### Introduction

The cost of raising dairy replacement heifers accounts for 15 to 20% of the total costs of the dairy enterprise. On an individual animal basis, a previous economic analysis reveals that it costs approximately \$1,300 to raise a Holstein heifer from birth to calving at 24 months of age.

Rising average replacement rates, from 30% in 1996 to 38% in 2001, coupled with the need to fill new or expanded facilities, has fueled strong demand for heifers during the past few years. The strong demand for replacements has led to increased prices for dairy heifers throughout the United States, especially in the west (Figure 1). Reported prices for top springers at sales yards have averaged \$1,900 (range: \$1,150 to \$2,500) for the two-year period October 2000 to 2002.

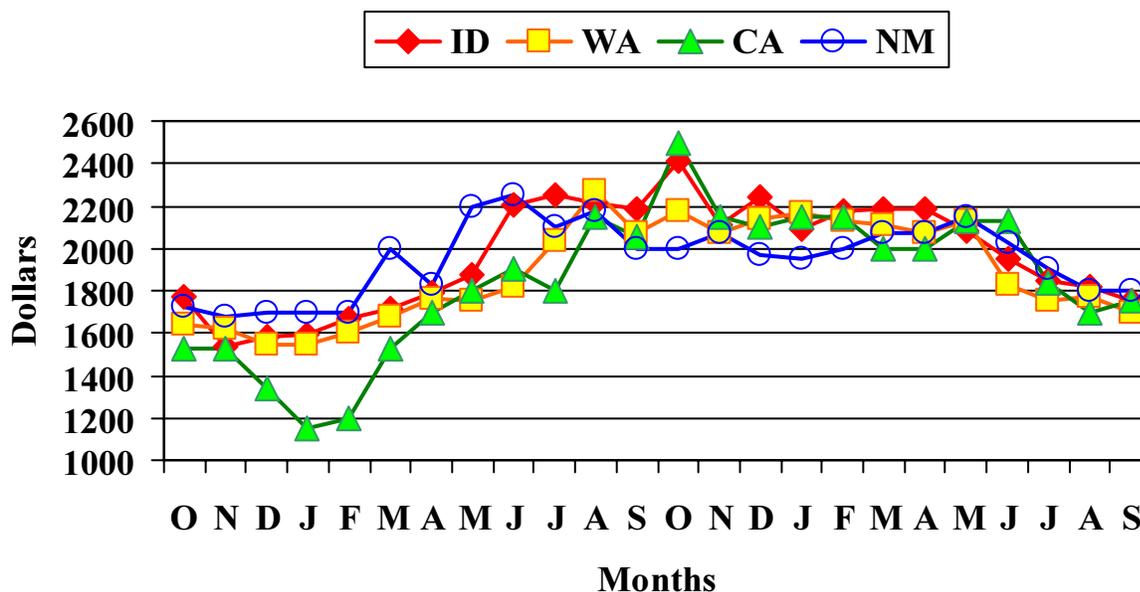


Figure 1. Reported prices for top springers at sales yards in Idaho (ID), Washington (WA), California (CA), and New Mexico (NM) during the two-year period October 2000 to 2002.

Given the high cost of purchasing replacement heifers and rising average culling rates, what can you do to meet the demand for dairy replacements? Let's discuss replacement heifer strategy and general management issues with our panelists Doug Maddox and John Noble. We'll begin with a brief background of each of our panelists.

Doug Maddox is a 1957 graduate of California Polytechnic State University, San Luis Obispo. In 1957, Doug and his family started RuAnn Dairy in Riverdale, CA. Over the years the dairy and farming operation gradually expanded through the purchase of neighboring farms. Maddox Dairy, with a

capacity of 3,500 lactating cows, was built in 1980. Currently, Doug and his family milk nearly 5,300 Holsteins, of which approximately 75% are registered. The family also farms approximately 10,000 acres. The farming operation includes wine vineyards, almond trees, cotton, forages and various cash crops. An embryo transfer program has been an integral part of the management strategy at RuAnn and Maddox Dairies for the past 15 years. Doug and his family live in Riverdale, CA.

John Noble is a 1976 graduate of Cornell University. The original family dairy was started six generations ago, in the mid 1800's. Currently, Noblehurst Farms, Inc., milks 1,200 cows and is owned by twenty family and non-family members. In addition to being president of Noblehurst Farms, Inc., John is a partner in Linwood Management Group, a subsidiary of Noblehurst Farms, Inc. Linwood Management Group is responsible for the management of seven dairies and nearly 6,500 lactating cows. For the Linwood Management Group, John personally oversees two dairies, with 2,200 and 1,300 lactating cows, respectively. John and his family live in Pavilion, NY.

*Please briefly describe the housing for lactating cows, milking parlors, and production statistics at each of your farms.*

**Doug Maddox:**

At Maddox Dairy, the cows are housed in free stalls with outside lots. At RuAnn Dairy, half of the cows are housed in free stalls with outside lots. The other half of RuAnn is the original dairy, which consists of loose housing (outside lots) with sunshades. Any cows that do not adapt to free stalls, rather than beef them, they come to the original RuAnn Dairy. Four double 13-herringbone parlors are utilized at Maddox dairy, and we use double-10 herringbones in each of the parlors at RuAnn. We milk 3x and our RHA is 27,500 lb milk, 970 lb fat, and 880 lb protein.

**John Noble:**

At Noblehurst, all our cows are housed in free stall barns and milked in a double-22 parallel parlor. Currently, our RHA is 23,000 lb milk, 900 lb fat, and 700 lb protein.

*Please describe your heifer management system.*

**Doug Maddox:**

We raise all of our calves at Maddox Dairy. Our young calves are housed in either a calf barn (with a capacity of 700 calves) or individual hutches. After weaning at 60 days, calves are housed in dry lots with shades in groups of 15 at RuAnn Dairy and 25 at Maddox Dairy. Our key to growing heifers is to feed a high protein ration to support maximum growth along with enough energy to support the growth, but not too much energy to make the heifers fat. The ration usually contains alfalfa hay and grain.

**John Noble:**

Within three days of birth, our calves go to a calf ranch for the first 11 weeks. At the calf ranch, the calves are housed in calf barns (with a capacity of 100 calves) in an "all-in, all-out" management scheme. One barn is filled each week, and then when the calves are big enough, the group of calves are moved to another barn. The barn is cleaned, sanitized and kept empty for a week before refilling the barn. About 10 dairies have their calves raised at this calf ranch. All calves receive milk replacer until weaning at about 35 days of age. After weaning, the calves are transferred to a transition facility for about 6 weeks. Then the calves are moved to another facility until breeding age. The ration during this time consists of corn silage, alfalfa haylage, and grain. At breeding age, heifers either stay in our system, are bred and moved to various locations where we keep bred heifers, or are shipped south to heifer growers who breed and keep our heifers until two months prior to calving.

*Please describe your strategy for breeding your heifers and your overall goals for your heifers.*

**Doug Maddox:**

We sort our heifers at 14 months of age, so that we can put together a uniform group. If we have some small heifers at 14 months of age, we'll sort them and place them back in a previous pen. If we have a few extra-growthy heifers less than 14 months of age, we'll place them in with older heifers. But we don't want any heifers to calve at less than 22 months of age. Our goals for our heifers are to be 52 inches at the withers and approximately 850 to 900 lb at the time of breeding. Weight is not as important to me as height because an 800 lb heifer at breeding that is a short, round pig doesn't do me any good. Our embryo transfer program begins with our heifers as they reach breeding weight and age. Except for the elite heifers, we try and put embryos in all of our heifers. We'll use AI (with a calving ease bull) if a heifer doesn't settle after embryo transfer. The elite heifers receive AI, and the best of the elite heifers are flushed. I like the heifers to calve at 24 months of age, weigh 1,500 lb, and be 56 inches at the withers. To be honest, a lot of the heifers reach our goals at calving, and the ones that don't are often poor-doers that don't milk well. Our average peak milk production of our first lactation heifers is about 94 lb.

**John Noble:**

We will breed most heifers two or three times AI, then we use clean up bulls. We do not utilize embryo transfer in our heifers. Our goals are for our heifers to be 56 inches (at the withers), and 1,250 to 1,300 lb at calving at 23 to 24 months of age. Unfortunately we haven't been able to achieve our height goal of 56 inches at calving very often.

*What is the death loss in your heifers? Also, do you cull heifers prior to first calving?*

**Doug Maddox:**

Our death loss is about 1.8 % between birth and weaning and about 2.0 % between weaning and first calving. You wouldn't think that you should lose any heifers after weaning, but sometimes between 2 and 8 months of age, we do. If at 14 months of age we don't think a heifer is going to make it in our program, we'll sell them as open heifers, guaranteed to breed, of course.

**John Noble:**

Our death loss is 1.5% between birth and weaning, and probably less than 1% between weaning and first calving. Our culling gets more aggressive as we grow out our heifers, and we will cull poor-doers, heifers that don't appear to fit our system, and non-breeders.

*What is the average age of cows in your herd? How many cows and heifers are sold and purchased annually for dairy purposes? What is your annual replacement rate (cull rate and death loss)?*

**Doug Maddox:**

The average age of our cows is approximately 47 to 48 months of age. During the past year or so, we have sold about 200 cows and heifers. If a good cow doesn't get bred until close to the dry period, and I've got to carry her a long time, I'll sell her if I've got plenty of cows. We don't bring in (buy) any cows. Our annual replacement rate is about 36 %.

**John Noble:**

The average age of our cows is between 48 to 50 months of age. We have not bought or sold any cows or heifers recently. Our annual replacement rate is 34%.

*Let's talk about the embryo transfer program at RuAnn Dairy and Maddox Dairy.*

**Doug Maddox:**

We've been utilizing embryo transfer for about 15 years. Our herd veterinarian, who works exclusively for Maddox and RuAnn Dairies, is in charge of herd health and the embryo transfer program. As a courtesy, our veterinarian will also provide embryo transfer services to our neighbors.

*How are donors chosen?*

**Doug Maddox:**

Our criteria include the top 10% of our herd in production, type, and pedigree. I'd love to have all our donors be scored excellent, 10,000 lb over herdmates, with high components, but obviously that's not always possible. With our heifers, only the most elite are chosen to be donors. I'm a big believer of "like begets like." You want your donor cows and heifers to be fancy. If you want to have big, tall, straight, deep-ribbed, good-legged cattle, you pick them to be mothers (donors).

*As discussed earlier, most of your heifers receive embryos as a first choice. Do you utilize lactating cows as recipients, also?*

**Doug Maddox:**

Yes, we do. We take the cows that we catch standing in heat (that are clean and ready to breed), and put an embryo in them. We put embryos into cows primarily because we have some embryos that are from non-calving ease bulls. We divide our embryos up into calving ease and non-calving ease groups. The embryos from calving ease sires go into the heifers, and the embryos from non-calving ease sires go into cows. After embryo transfer, we're normally around 40 to 50% conception rate in our cows, and 60% or greater in our heifers. We'd like to put as many embryos as possible in our heifers to take advantage of the increased conception rate, but some of these bulls sire calves that are so big that they'll tear up the heifers.

*What is the typical reproductive timeline for a lactating donor?*

**Doug Maddox:**

We normally schedule the first flush to occur after the first standing heat after 60 days in milk. When we tried to flush them too soon after calving, we had problems. If you can do this after a standing heat, we have greater success. Now we get a pretty high percentage of cows pregnant after flushing, where it used to be that we didn't like embryo transfer because it was hard to get them bred back after flushing. Normally, we'll flush her twice on back-to-back estrous cycles and then return her to the AI program.

*Is embryo transfer performed year-round? What percentage of embryos are frozen compared to those transferred directly?*

**Doug Maddox:**

Embryo transfer is performed year-round, but we do cut it back during the hot months of July and August. Oh, probably 30% of the embryos are frozen for later use. We like to transfer embryos directly, but we also like to keep a bank of about 500 frozen embryos. That allows us to export some, and offer some for sale if a buyer comes in. In July and August when it's hot and we don't make a lot of embryos, it also allows us to put embryos in our cows. We'll do a little better on embryos during those months than AI, because of early embryonic death (in AI bred cows subjected to intense heat).

*Are you currently sexing embryos? If not, are you interested in sexing embryos in the future?*

**Doug Maddox:**

We are not currently sexing embryos. I would love to sex embryos if we could get it down to where it would be economically feasible.

*In the future, will sexed semen be integrated into your embryo transfer program?*

**Doug Maddox:**

This whole game will change when sexed semen becomes available. Yes, of course, we will utilize sexed semen in our embryo transfer program. If we had sexed semen, and performed embryo transfer on the top 10% of the herd, then took the top 50% of the resulting heifers as replacements, do you know what kind of herd you could have and how fast you could develop it? Now, we'd really be on the fast track.

*Describe the costs associated with your embryo transfer program.*

**Doug Maddox:**

There are about three different costs. The drug costs for FSH and prostaglandin are about \$25 to \$30 per flush. Next, you have the semen costs. We use some expensive bulls (\$30 to 40 per dose). We want the best bulls that we can get. Then there's the labor cost of the veterinarian and technician. Then there's hidden costs, like what you lose due to extended days open because it may be difficult to get the cow bred after flushing. There's a hidden cost of reproductive efficiency and in (possible) decreased milk production. We had a cow that was going for a 50,000 lb record, so we flushed her three times. Well, during each flush she would drop in milk. Her record ended up closer to 45,000 lb. Did we lose 5,000 lb of milk? I don't really know, but I think we did. Easily, with all the costs described, it costs \$100 per embryo produced.

*Has the embryo transfer program helped to meet your demand for replacement heifers? If not, what other strategies have helped meet your demand for replacement heifers?*

**Doug Maddox:**

It's important to realize that embryo transfer has not (directly) increased the number of heifers available for our replacement needs, rather embryo transfer has allowed us to improve the quality of our herd. Remember if a cow or heifer is going to have a calf, she'll have one whether she receives an embryo or gets pregnant from a jump bull. In the long term, embryo transfer should raise your production, raise the overall quality of the herd, and increase cow longevity. As cow longevity increases, fewer replacements may be needed annually. Another strategy we use to increase the number of pregnancies in our herd relates to our AI program at Maddox Dairy. Currently, we do not use any outside semen, that is, semen from AI studs in our AI program at Maddox Dairy. We pick twenty of our own bulls each year and collect 500 units of semen from each of these bulls. Then we'll use AI on cows that are housed with the bull that produced the semen. This management strategy results in 50 to 60 more pregnant cows per month than if we did not run the bull with the cows. Once we're finished with the AI doses from the bull, we send him to slaughter. Of course, the cows in our embryo transfer program at Maddox Dairy are bred with semen from the best bulls available.

*What recommendations do you have for producers who wish to begin an embryo transfer program?*

**Doug Maddox:**

Our original goal was to sell enough embryos (export) to pay for the embryo transfer program. Although we may sell \$50,000 to 200,000 worth of embryos, we really don't always pay for the embryo transfer program with embryo sales. We sell 2,000 breeding bulls to commercial dairymen each year. That's what really allows us to keep the embryo transfer program, the registered cows, classification, and breed association programs. Also, we don't sell enough surplus cows or heifers each year to pay for the embryo transfer program. What differentiates dairymen are their goals for their herd and farm. I've talked with a lot of people that have begun to raise bulls because they need the extra income. But what people forget is that we've been in this business for 45 years and we've been investing in super genetics. If we didn't invest in super genetics, how long do you think we'd have our market? Also, it's very important to be a people person. When people come to visit, you've got to tell them about your cows and your entire program. A lot of people will start and stop (embryo transfer and raising bulls), because it doesn't fit their personality, operation, or particular situation.

*Let's go back to 1980. What would you change about the course of your dairy business?*

**Doug Maddox:**

That was about the time when we built the 3,500-cow Maddox Dairy. There were a lot of good things that we did. But, I probably would have gone all Jersey. Holsteins and concrete and free stalls have always been a problem. One of the reasons I think the industry is short of replacements is because Holsteins don't handle the concrete nearly as well as Jerseys do. We've always fought feet and leg problems, breeding problems, and death losses in that big herd. I think I could have done a better job with Jerseys. I think we could have developed quite a Jersey herd with the amount of embryo transfer we've done.

*Looking back, what would you change about your replacement heifer raising strategy?*

**Doug Maddox:**

We could have done a better job of raising our heifers. We were guilty of getting our heifers too fat early on. Recently, in the last few years we've gotten better at raising our heifers. We don't feed corn silage to heifers. We have structured our ration to be high protein, lower energy. I think we're doing a much better job of raising our heifers now.

*Let's talk about the sexed semen program that involves Noblehurst Farms, Inc.*

**John Noble:**

There are 10 dairy farmers that formed a company called "Advanced Dairy Genetics." Within Advanced Dairy Genetics there are three cluster herds. We pick young bulls from dams in our own herds and then have them housed and semen collected at Genex. After a predetermined amount of semen is collected and sorted, the bulls are sent to slaughter and other young bulls enter the program. As you can see we are trying to shorten the generation interval. We have been sorting semen on a very limited basis since May 1, 2002. We have been using sexed semen on a trial basis as we figure out how to operate the machine, and what the optimal concentration of the dose should be. So far (October 2002), we've used thirty-two units of sexed semen. The machine we're using is the MoFlo unit produced by Cytomation and XY, Inc., of Fort Collins, CO. We've committed to purchase the unit at a price between \$250,000 to 300,000.

*Do you sort fresh semen or frozen-thawed semen? Will you inseminate heifers and lactating cows with sexed semen?*

**John Noble:**

After collection, the semen is transported to Advanced Dairy Genetics where we have a technician sort the fresh semen. We will only be utilizing sexed semen in virgin heifers.

*When the program is up to full speed, how many heifers will be inseminated with sexed semen? What will be the cost per dose of semen?*

**John Noble:**

We hope to inseminate 6,000 heifers per cluster. We are going to sample 8 bulls per cluster, and with 3 clusters, that works out to about 750 doses per bull. We calculate our costs to be about \$50 per unit. That's to give us a three-year payback on the machine. Therefore, we are initially charging ourselves \$50 per unit.

*Are you going to incorporate embryo transfer into the sexed semen program in the future?*

**John Noble:**

We might include embryo transfer into the program. Currently there are a few in the group that are using embryo transfer (without sexed semen), but for us, we don't have the resources at this time to utilize embryo transfer.

*What other strategy do you think you might use in the future to meet the demand for replacement heifers?*

**John Noble:**

We are constantly trying to upgrade our replacement heifer program and bring new animals into the system. I think a lot of dairies are trying to reduce the culling rate so that they can grow with a reasonable replacement program.

*At Noblehurst Farms, Inc., what areas might be improved to reduce the annual replacement rate? Also, has the annual replacement rate risen, stayed the same, or declined over the last four years?*

**John Noble:**

The transition period is the most difficult for us. We're also looking at bedding, free stall design, and getting the animals off concrete at least for a little while. There are a myriad of small management items that we are trying to adjust. The annual replacement rate has declined over the last four years.

*What recommendations do you have for producers who wish to begin a semen-sexing program to help meet their need for replacement heifers?*

**John Noble:**

I believe it is very important to realize that we don't have to do it alone. Banding together groups of dairy farmers to accomplish specific tasks, whether it is buying inputs, or sexing semen, I think working together in small groups, we can be pretty effective.

*Let's go back to 1980. What would you change about the course of the dairy business at Noblehurst Farms, Inc.?*

**John Noble:**

With hindsight, I think I would have designed the barns a little bit differently, I would have used sand instead of sawdust and mattresses, but given the status of research and technology at the time, I'm not sure that I would have done a lot of things differently.

*Looking back, what would you change about your replacement heifer raising strategy?*

**John Noble:**

We originally expressed interest in sexed semen in 1976. Nevertheless, the technology was not ready yet. If I could have done something differently, I would have built facilities to house all of our heifers in-house. But, given the nature of concentrated animal feedlot operations, and the handling of manure, I think we're probably better off with a variety of facilities, even though it adds cost to our operation. That way we can keep the manure spread out.

**Summary**

Rising average replacement rates, from 30% in 1996 to 38% in 2001, coupled with the need to fill new or expanded facilities, has fueled strong demand for heifers during the past few years. Doug Maddox has utilized an embryo transfer program to increase milk production and raise the overall quality of the RuAnn and Maddox Dairy herds for the past 15 years. Although Doug is quick to point out that embryo transfer has not directly increased the number of heifers available for his replacement needs, Doug admits that increased longevity of the herd due to embryo transfer may lead to fewer replacements needed annually. Other strategies which likely contribute to the achievement of replacement heifer needs at RuAnn and Maddox Dairies include 1) a below average annual replacement rate (36%), 2) below average heifer death loss, 3) utilizing embryo transfer during the hot months of July and August to create pregnancies, and 4) the collection and use of semen from selected bulls in the AI program while they are housed with lactating cows. Doug credits this last management strategy with 50 to 60 more pregnant cows per month compared to AI without natural service bulls housed with the cows.

Through the formation of Advanced Dairy Genetics, John Noble and 9 partners are attempting to directly increase the number of replacement heifers available to meet their needs. Through a closed, three-cluster herd approach, Advanced Dairy Genetics has selected bulls from each cluster herd, collected, and sorted the semen. Thirty-two heifers have been inseminated to date, with plans to inseminate 18,000 heifers. The success of the semen sexing endeavor is unknown at this time. Nevertheless, current strategies at Noblehurst Farms, Inc., which likely contribute to the achievement of replacement heifer needs are 1) the below average annual replacement rate (34%, which has been declining over the past few years), 2) below average heifer death loss, and 3) management attention to detail (transition cows, amount of time spent on concrete).

The success of Doug Maddox and John Noble is testimony that attention to detail in all facets of the dairy business, coupled with the integration and fine tuning of technology, and willingness to form partnerships with family members and fellow producers, can lead to meeting the demand for dairy replacements.