

Dairy challenge #1

Most cattle have the ability to grow horns. These horns can be dangerous to other cattle in the herd, as well as the humans that care for them. Dehorning cattle can be an expensive and tedious process and isn't always effective as a permanent solution. How might you produce cattle without horns?

Dairy challenge #2

In order to produce milk, cows need to have a calf each year. However, having calves takes time and interrupts the production of milk. How can we extend the milking cycle of cows to reduce the number of pregnancies needed in their production cycle?

Dairy challenge #3

Lactose intolerance from milk is common in humans. This intolerance is associated with the sugar found in cow's milk. How might we produce cows that do not produce lactose in their milk? Or how can we make lactose more tolerable to humans?

Dairy challenge #4

Fatty liver disease is the accumulation of excessive fat in a ruminant animal's liver. It is especially common in cows during calving time, and without treatment it can affect the healthy development of the calf and milk production. How might you produce a cow that is resistant to fatty liver disease?

Dairy challenge #5

Dairy cattle can be very large and require a lot of nutritious feed to produce high quality milk. How might you create a cow that can produce the same volume of milk on less feed?

Dairy challenge #6

Jersey cattle are known for producing milk at a lower volume but with higher butterfat content than other dairy cattle breeds. This milk has a higher profit margin per volume than the milk of other breeds that produce a high volume, lower butterfat content milk. How might you produce a cow that can deliver a higher volume AND higher butterfat content milk?

Dairy challenge #7

Cattle produce gases as a natural byproduct of fermentation as they digest their feed. These gases are partially composed of greenhouse gases which may be considered bad for our environment. How might you reduce the production of greenhouse gases in cattle from fermentation?

Dairy challenge #8

Mastitis is an infection that occurs in a cow's udder, causing inflammation and reducing her ability to produce high-quality milk. How might you produce a cow that is resistant to mastitis?

Dairy challenge #9

As cattle eat forages as part of their diet, the process of fermentation causes gases to form when complex carbohydrates are broken down.

How might you create a forage crop (hay) for cattle that has fewer complex carbohydrates so that fewer gases are formed from fermentation?

Dairy challenge #10

As our population grows we will need to produce more milk to provide affordable protein options.

How might we increase the cow's ability to produce milk with a higher protein volume?

Dairy challenge #11

Dairy cattle consume about one to two gallons of water per 100 pounds of body weight on a daily basis to produce high quality milk. How might we decrease their need to consume as much water to produce the same volume of milk?

Dairy challenge #12

Dairy cattle need to stay cool in warmer climates to be comfortable and produce milk. How might we breed cattle with lighter coats that enable them to stay cooler in warm climates?

Dairy challenge #13

Corn is a crop used to feed dairy cattle. It requires the addition of nitrogen to reach its full potential.

Soybeans are legumes and have a symbiotic relationship with Rhizobia bacteria, so they do not need added nitrogen. How might scientists create corn that is a legume and reduce the need for added nitrogen?

Dairy challenge #14

Silage (partially fermented plant material) is important in a dairy cow's diet. Most silage is composed of a partially-dried whole corn plant that is chopped up and stored in a sealed container to create an anaerobic environment. The process of maintaining this environment requires extra resources and drives up cost. How might we create a fermented feed ration for cattle that does not require an anaerobic environment?

Dairy challenge #15

Dairy cattle need to stay cool in warmer climates to be comfortable and produce milk. Sweating helps cool both humans and animals off. Cows currently only sweat at 10% of the human rate. How could you increase the efficiency of how much cows sweat?

Dairy challenge #16

Dairy farmers across the nation try to reduce the cost of feeding their cows by incorporating crops that are grown in their local area/state. For example, farmers in the Midwest will often use soybean meal, while farmers in the South can use canola meal instead of paying to ship soybean meal to their state. How might we modify crops so that they can be grown in areas that they don't typically grow in?

Dairy challenge #17

Bovine respiratory disease (BRD) can impact the overall health of calves, including reduced growth rates and decreased milk production as they age.

How might we breed for calves that are more resistant to BRD?

Dairy challenge #18

Colostrum is the first milk a dairy cow produces after giving birth to a calf. It is rich in antibodies that help to build up the calf's immunity to a variety of diseases. Colostrum also contains high levels of nutrients such as protein, fat, vitamins, and minerals, which are key to supporting the calf's growth and development. However, not every cow produces a high volume and/or high quality of colostrum. How might we continue to improve a cow's colostrum production (volume or quality)?

Dairy challenge #19

The mammary gland is an organ that all mammalian species have to nourish their new born young. The mammary gland of cows is called an "udder." Inside the udder are the alveoli. Alveoli are cage-like structures wherein milk is synthesized and secreted. An alveolus is the discrete milk-producing unit. How can we increase the amount of milk (volume) produced by the cows?