Tour de France Cyclist vs High yielding dairy cow

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At vet school I remember one of my farm lecturers comparing a dairy cow to a Tour de France cyclist, which having watched the cycling last month, does seem a little extreme. The Tour de France sees cyclists covering over 2100 miles over 3 weeks, including grueling mountain stages in The Pyrenees and The Alps. Seeing the competitors cycle up and down mountains for 4-5 hours a day and pretty much pass out at the top does not seem comparable to the dairy cow just standing and merrily chewing the cud. So, I thought I would crunch the numbers and see why my lecturer made this comparison.

The Tour de France cyclist

Maintenance energy requirements for a young 65 kg whippet of a man would be 2000 calories. On the very mountainous stages of the race they will use 9000 calories in a day, so **4.5 times their maintenance requirement**. Therefore, they must eat 9000 calories on some days in the race or they will risk rapid weight loss which leads to loss of strength and fatigue. To put those 9000 calories into perspective, that is the equivalent to 27 regular cheeseburgers - though I suspect their diet is a little more varied than that! They also drink around 10 litres of water per day; that is three full 6-pint milk bottles.

Chris Warren, The GVGs closest example of one of these specimens!

The high yielding dairy cow

I am going to base these figures on a 700 kg Holstein cow giving 50 litres of milk, this is obviously quite an extreme dairy cow but we are up against abnormally fit cyclists and this is actually a reasonably common sight on our dairies. The units of energy we use when talking about dairy cow nutrition are megajoules (MJ) as calories are a bit small and don't quite cut it. 1 MJ is equal to 239 calories (roughly equivalent to a Snickers bar). The energy figures for a 700 kg Holstein dairy cow giving 50 litres of milk daily are:

- Maintenance requirement – 80 MJ
- Pregnancy – 40 MJ (this is when at term so we will ignore this as high yielding cows will only be in the early stages of pregnancy, if at all)
- Production – 5.3 MJ per litre of milk produced

Maintenance + Production = Total energy needed

80 MJ + (50 X 5.3 MJ) = **345MJ**

That certainly is a lot of Snickers! It also works out at **4.3 times maintenance.** Not quite the cyclists 4.5 times maintenance, but they are only doing that on a few days of the three week race, while the dairy cows will be doing this day in, day out and we see plenty of cows yielding at more than 50 litres per day.

Let us put that 345 MJ into context with cow feed rather than chocolate bars. For simplicity we will look at a total mixed ration (TMR) diet: this is where all the feed a cow gets is mixed and fed at the feed face, no other feed is given during the day (e.g. no cake is given in the parlour). Typically, a TMR diet for a high yielding group would be 12 MJ per kg dry matter (dry matter is the weight of the feed excluding any water content). So, to get to 345 MJ we need 29 kg dry matter intake daily. A TMR diet will typically be 50-55% dry matter content, so the weight of feed needed to be consumed daily will be 55-60 kgs (nearly a whole cyclist!) Add on to that the 240 litres of water they need to drink on a daily basis and it is a wonder they have time to do anything else!

With high yielding cows needing to eat and drink that much in a day there are some important requirements that need to be met to ensure intakes are as high as possible and that cattle are getting what they need from their food.

Feed availability

We need to make sure these cattle have feed in front of them at all the times when in the cubicle shed. It is advised for TMR diets that feed is available for over or equal to 22 hours a day, so basically anytime they are not being milked. This will involve feed being pushed up regularly so it can be reached.

Diet Composition

We need to make sure the diet is made up so that cow's intake the correct amount of energy and protein. The proportions of fibre, starch, oil and sugars need to be correct to ensure good gut health.

Diet presentation

To ensure every cow can get to feed at an open feed face, 0.75 metres per cow is needed. Where locking head yokes are in use (pictured) it is recommended that the number of cows in the group should not exceed 85% of the available yokes. This will ensure

bullying is kept to a minimum when fresh feed is put out and less dominant cows can always get to it.

The constituents need to be thoroughly mixed and cattle should not be able to sort through the feed - chopping any long fibre to muzzle width (10cm) will prevent this. Any leftover feed should be scraped away before new feed is put out for them. If this is not done the feed will heat up and spoil in front of the cows which will reduce intake.

Water

There needs to be a minimum of 10cm water trough space per cow, which allows 10% of the herd to drink at any one time. Also, the refill rate of troughs needs to be sufficient, this will vary on the size of trough but bear in mind cows can drink up to 20 litres in a minute.

Monitoring

We can monitor nutrition by looking at changes in body condition of the herd over the course of the lactation by regular scoring, with the aim that not too much condition is lost in early lactation and not too much is gained in late lactation. Milk composition and yields also give a good indication of what is going on. Yield and the protein content of the milk are related to the energy in the diet and the fat level gives a good indication of the fibre content and rumen health.

Hoping you are all well

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