



reduce investments (i.e. renewing machinery, introducing new breeds or changing the type of product). In the case of a scenario of rise of input prices, farmers would focus on measures related to feeding management such as extending the grazing season or seeking for new pastures.

Farmers thought that the best strategy to face short-term effects of both, a prolonged drought and a rise of input prices would be to reduce production costs.

Besides this general strategy, we found that age, on-farm fattening and farmland area influenced farmers' perception on adaptation practices. Farmers above 51 years were significantly more determined to look for new pastures than the younger ones in an increase of input prices scenario. This could be related to the fact that young farmers tend to reduce labor and increase technification. Farmers that did not fatten on farm would be more likely to look for new pastures, while they considered less relevant to invest in renewing machinery or facilities, both in an increase in input prices and a prolonged drought scenarios. Finally, owners of large farms (above 77 ha) were significantly more determined to change indoor diets than farmers with smaller farms.



To conclude:

1. Farmers considered that implementing actions aiming to **reduce costs** such as eliminating worst adapted animals, diversifying activity out of agriculture and seeking for new pastures and self-sufficiency, would be the most relevant strategies to adapt to both increase in input prices and drought scenarios.
2. These strategies apply to short-term perturbations scenarios. **Farmer strategies to adapt to mid or long-term perturbations might be different.**
3. **Farm and farmers' characteristics** such as farmer age, farm size and on-farm fattening, **modify farmers' strategies to face challenges** related to climate change.
4. Some of the most relevant actions that are usually pointed out when analyzing farming at a systemic level such as introducing more adapted breeds, diversifying farm activity, seeking for external advice or modernizing farm technologies, were considered by farmers as having low relevance.

How do beef cows cope with short nutritional challenges during lactation?

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In the typically extensive suckler cattle production systems in mountain areas, diet quantity and quality can vary widely both in the long and the short term. The objective of this experiment was to **determine the mechanisms through which suckler cows respond to short but severe nutritional challenges** that may occur during lactation, and **analyse if their ability to cope with such challenges and maintain their performance depended on the stage of lactation.**





In order to do so, the performance and plasma oxidative status of 16 Parda de Montaña autumn-calving suckler cows (calving LW 643 kg, calf birth LW 44 kg) were analysed in response to a 4-day restriction in months 2, 3 and 4 post-calving. Prior to restriction and after the challenge, the cows received a diet meeting 100% of their energy requirements (7.0 kg DM hay, 2.7 kg DM concentrate), while in the 4-day challenge, the diet met 55% of cow requirements (6.2 kg DM hay) (Figure 1). Dam and calf live weight (LW), dam milk yield (MY, weigh-suckle-weigh technique) and plasma malondialdehyde (MDA, indicator of lipid peroxidation) were measured twice the week before the restriction (basal), daily during the 4-d challenge and on the first 2 days of refeeding. All procedures were approved by the Animal Ethics Committee of CITA-Aragón (ref. 2018-01).

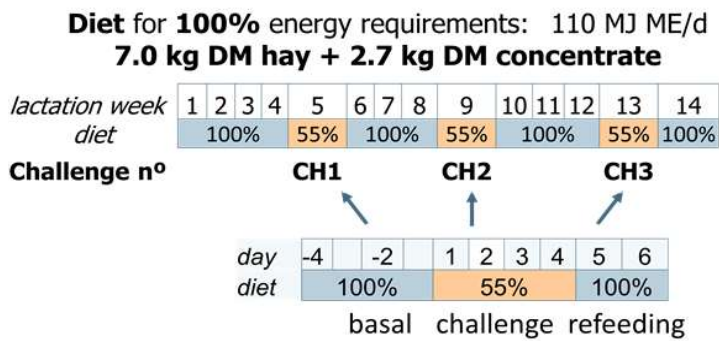


Figure 1. Experimental design

As lactation advanced, basal values of dam LW, milk yield and MDA concentrations decreased from month 2 to 4, implying that **decreasing performance after peak production reduced the oxidative status.**

The individual **response to undernutrition was immediate during the challenge, but resilience was reduced throughout lactation**, since recovery of basal values after a 2-day refeeding was complete at the start but not at the end of the study.

- Dam LW dropped immediately on the first day of restriction and did not recover by day 2 of refeeding in any month. Similarly, calf gains decreased during the challenge and did not fully recover during refeeding.
- Milk yield also dropped during the challenge, and thereafter recovered the basal values by day 2 of

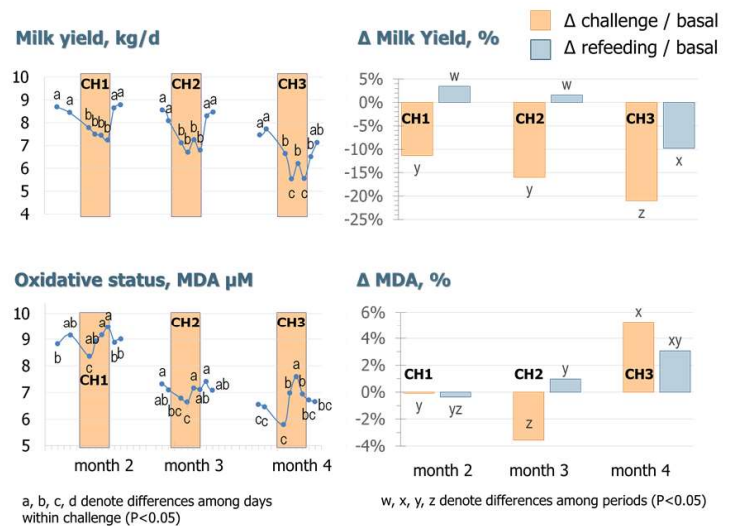


Figure 2. Changes in milk yield and oxidative status of cows following nutritional challenges during lactation.

refeeding in months 2 and 3 but not in month 4. The percent reduction of MY during the challenge increased through lactation, but recovery was lower in month 4 than the rest, when basal values were not reached after refeeding.

- Plasma MDA fell to a minimum at the start of the challenge, then increased sharply and finally returned to basal values in refeeding in all months. The difference between maximum and minimum MDA concentrations increased as lactation advanced, indicating a stronger oxidative response.

These preliminary results indicate that the patterns with which beef cows cope with short but severe nutritional challenges change throughout lactation, resulting in a lower ability to cope with the challenge and maintain performance as lactation advances.

Results presented at the 70th Annual Meeting EAAP (European Federation of Animal Science), Ghent (Belgium), August 26-30, 2019. "Performance and oxidative status and of beef cows facing short nutritional challenges during lactation". Book of Abstracts No. 25, page 617.

