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BRIEF COMMUNICATION: Whole-herd extended lactations in a pasture-based system: year one of a farmlet study

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Abstract

Extended lactations (EL) can potentially improve labour efficiency, reduce numbers of non-replacement calves, and reduce cow attrition. A 2023-24 farmlet study compared an EL system whereby half of the cows calved each spring with approximately 24-month calving intervals versus a Control system where all cows calved each spring with approximately 12-month intervals. The EL system produced more milksolids (MS) than Control (1,231 versus 1,182 kg/ha, respectively) from more days in milk (average of 308 across the two herds versus 251 days per cow, respectively) while consuming more supplementary feed (818 versus 621 kg DM/cow, respectively). Cows in EL produced on average 370 kg MS/cow over 304 days of lactation during the season, from a total of 855 kg MS/cow produced over a 600-day lactation. This study has shown the potential viability of this EL system and the data can be used to evaluate impacts on profitability and the environment.

Keywords: extended lactation, dairy cattle, New Zealand

Introduction

Extended lactations (EL) may improve labour efficiency, reduce non-replacement calf numbers, and cow wastage in New Zealand dairy systems while achieving similar production and profitability to conventional systems. Previous New Zealand research has explored EL at the animal level (Kolver et al. 2007; Phyn et al. 2009) and modelling studies based on the resultant data indicates a whole herd EL farm system to be a viable option (Farrell et al. 2023, 2024). The objective of this farmlet study was to demonstrate a pasture-based EL system, with a 24-month calving interval whereby half of the herd calves each year, and to compare performance and management relative to a control 12-month calving system.

Materials and methods

Two farmlets were established at Scott Farm near Hamilton in a study which ran from 1 June 2023 to 31 May 2024. All procedures had animal ethics approval from the AgResearch Animal Ethics Committee, New Zealand (application 2009). The farmlets had predominantly Holstein-Friesian cows managed within their farmlet area with a stocking rate of 2.8 cows/ha to target 1,450 kg/ha of liveweight. The Control system farmlet had 30 × 0.5 ha paddocks and started with 42 dry cows due to calve starting 5 July, including nine first-calving heifers (21% replacement rate). The EL system farmlet had 60 × 0.5 ha paddocks and started with 41 non-pregnant cows in an extended lactation that had calved in spring 2022 (EL2) and 43 dry cows (EL1) due to calve starting 5 July, including 14 first-calving heifers (17% farmlet replacement rate). The Control and EL2 groups were mated for ten weeks from 26 September using artificial breeding only and based on observed heats. Milk weights were recorded daily, while milk composition and body condition score (BCS) were recorded fortnightly. A threshold of less than 0.5 kg MS/cow/day for two consecutive weeks was the dry off criterium for cows in the EL2 herd. Paddock pasture mass was estimated weekly via calibrated visual assessment and used to make a feed wedge for farmlet management including decisions around offering supplementary feed during a deficit, and conserving pasture as baleage during a surplus. Post-grazing residual pasture cover and nutrient requirement estimates informed feed allocations for each group of cows. Annual pasture eaten was estimated using the DairyNZ calculator (https://www.dairynz.co.nz/tools/pasture-and-crop-eaten-calculator/).

Results and discussion

The EL system farmlet produced more milksolids (MS) than the Control farmlet (1,231 versus 1,182 kg/ha, respectively) from more days in milk during the season on average (308 versus 251 days per cow, respectively) while consuming more total supplementary feed (818 versus 621 kg DM/cow, respectively; Table 1). Pasture eaten estimates were similar, while more pasture was conserved for baleage in the EL farmlet. The starting average pasture mass was approximately 2,400 kg DM/ha for both farmlets and the final figures were 2,700 and 2,500 kg DM/ha for Control and EL, respectively. The level of reproductive performance for Control cows was 79% for six week in-calf rate and an empty rate of 7%. In comparison EL2 cows; 73% and 22%, for six week in-calf and empty rates respectively. The latter were selected for the study from a pool of non-pregnant 'carry-over' cows, which may explain their poor performance beyond the first 6 weeks of mating.

The EL2 group produced on average 370 kg MS/cow over 304 days of lactation in the study year, which was the extended part of a total lactation of 600 days and a total of 855 kg MS/cow produced (Table 1). Two EL2 cows were dried off according to the low production threshold in December 2023 at 461 and 520 total days in milk. Final dry off for the EL2 group was 19 April 2024 based on farmlet pasture cover targets and low production; 18 of the starting 41 cows were present in the milking mob at this point. The daily MS production of the EL2 group was lower than the

Control and EL1 groups, with a less pronounced peak in spring (Fig. 1). The EL1 group produced on average 506 kg MS/cow over 311 days of lactation while the Control group produced on average 422 kg MS/cow over 251 days. Cows in the Control group were progressively dried off starting mid-February according to BCS targets for the following calving (https://www.dairynz.co.nz/resources/tools/dry-off-date-to-reach-bcs-targets-at-calving/), and final dry off was on 19 April based on BCS criteria and farmlet pasture cover targets (Macdonald et al. 2010). The average BCS of the EL2 group had a near continuous gradual increase across the year with a net gain of 1.6 scores. At the year-end, group average BCS were 5.8 for EL2, 4.1 for EL1 (still lactating), and 4.7 for the Control group. The differences between farmlets in final cow BCS and average pasture mass on 31 May will likely have carryover farm system impacts which were not captured in this first year of the study. A longer study will therefore be able to more fully report on the Control versus EL system differences.

Table 1 Key performance results for the Control (approximately 12-month calving intervals) and Extended Lactation (EL; approximately 24-month calving intervals) farmlets across the 2023-24 production year. The Control and EL1 groups had a planned start of calving date of 5 July 2023. The EL2 group had calved in spring 2022 and was in an extended lactation during the study year.

Farmlet	**Control**	**EL**	
Milksolids produced (kg/ha)	1,182	1,231	
Supplementary feed offered in total (kg DM/cow)	621	818	
Imported supplementary feed offered (kg DM/cow)	530	793	
Pasture eaten[1] (t DM/ha)	13.4	13.5	
Pasture conserved as baleage (t DM/ha)	0.96	1.08	
Farmlet baleage carried to 2024-25 (t DM/ha)	0.71	1.01	
EL group	-	EL1	EL2
Calving year	2023	2023	2022
Days in milk[2]	251	311	304
Milksolids produced (kg/cow)	422	506	370
Start BCS (1 June 2023)	4.8	4.9	4.2
End BCS (31 May 2024)	4.7	4.3	5.8
Three-week submission rate (%)	86	-	98
Six-week in-calf rate (%)	79	-	73
Overall not-in-calf rate (%)	7	-	22

[1] Pasture eaten was estimated from the DairyNZ calculator (https://www.dairynz.co.nz/tools/pasture-and-crop-eaten-calculator/). [2] The average after calculating individual lactation lengths for all cows in the study. For the Control and EL1 groups the start of lactation was the calving date, while for the EL2 group this was 1 June. For the Control and EL2 groups the end of lactation was a culling and/or dry off date, while for the EL1 group this was 31 May.

Management of the two groups in the EL farmlet differed for most of the year, as the nutrient requirements of cows in contrasting stages of lactation informed their feeding requirements and therefore prioritisation of pasture allocations. The EL2 group was allocated feed to a target of 18 kg DM/cow/day from year start until late-January when this was reduced to reflect the lower daily production and increased partitioning of energy for BCS gain. The two EL groups were managed as separate mobs at the start of the study year in June, where the in-milk EL2 group was allocated 80% of a paddock and the dry EL1 group were allocated the entire paddock the following day, i.e. were offered some fresh pasture as well as the residual from EL2. This prioritised feeding of the in-milk EL2 group while allowing for the EL1 group to consume minerals spread across the pre-graze pasture and achieving post-grazing residual targets. From July, as cows in the EL1 group calved they joined the EL2 group of milking cows. In mid-August the EL1 and EL2 milkers were separated to offer differential feeding, i.e. a lower allocation to EL1 cows not yet at peak production and intake, facilitating rotation length targets according to the Spring Rotation Planner (https://www.dairynz.co.nz/resources/tools/spring-rotation-planner/) and simplifying pre-mating heat detection of cows in EL2.

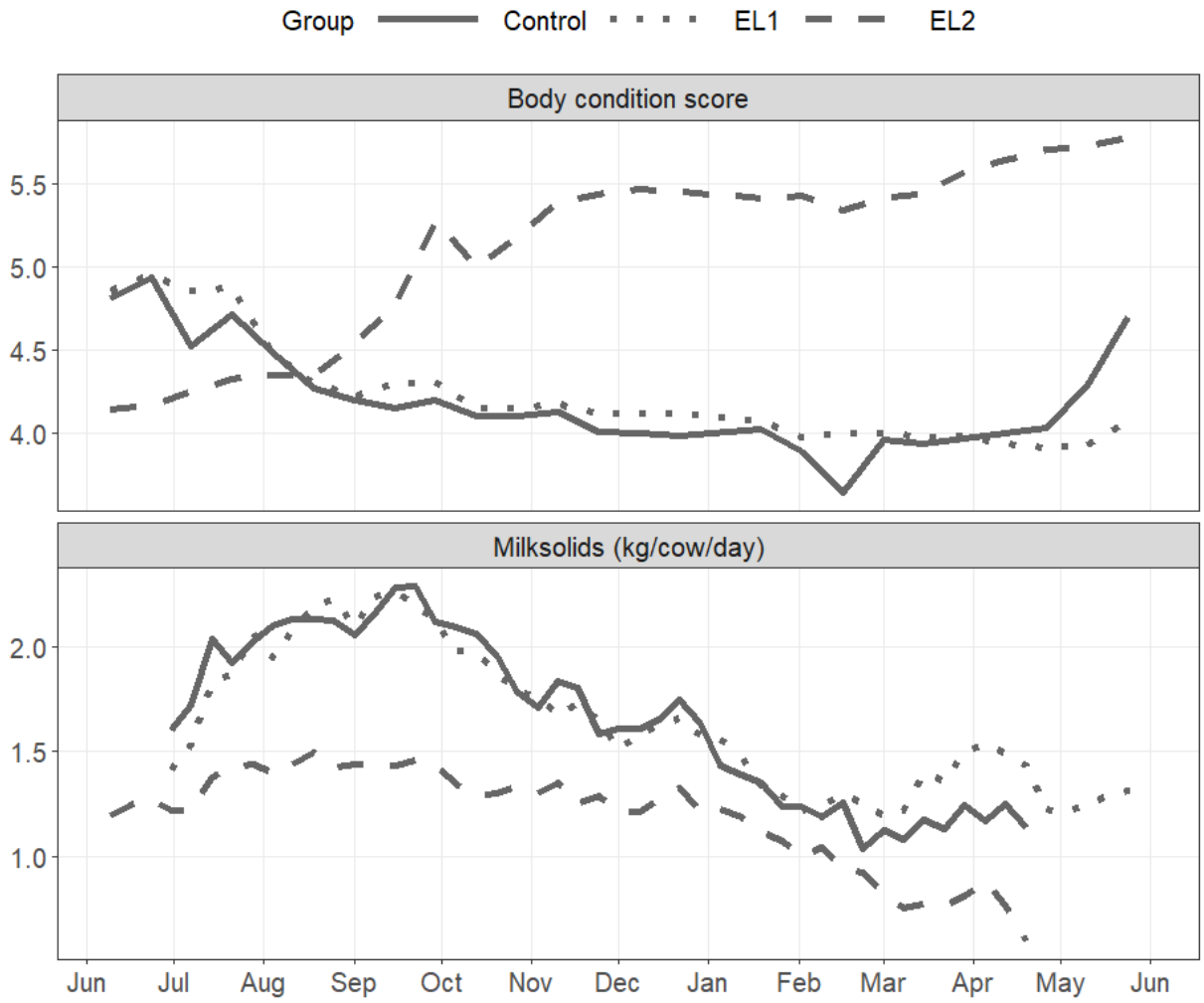

Figure 1 Daily average milksolids production and average fortnightly body condition score for cows in the Control (approximately 12-month calving intervals) and Extended Lactation (EL; approximately 24-month calving intervals) farmlet. Cows in the EL1 group calved in the spring of the study year while cows in the EL2 group had calved in the previous spring.

The EL groups remained separate for mating and were combined again for one month from 24 December for management ease. The EL groups were then separated for the remainder of the summer and autumn to once again differentiate their feed allocation, i.e. a lower allocation to the EL2 group approaching the end of their lactation. All cows in the EL farmlet were milked twice daily until early April when the EL2 group were milked once-daily ahead of final dry off. After dry-off on 19 April the EL2 group were allocated feed to target 8 kg DM/cow/day to minimise further BCS gain. The autumn and winter management of the EL2 group contrasted with the Control group, where milking frequency was reduced from twice to once per day in mid-February and, once dry, were allocated feed of around 12 kg DM/cow/day to gain BCS in preparation for the next calving.

The EL system produced more milk than Control through achieving more days in milk. The EL2 cows had the lowest daily milk production and appeared to partition feed into body condition gain. This group achieved their target calving BCS approximately 6 months ahead of next calving and thus EL2 cows were kept in-milk provided they met the production threshold. This contrasted with the Control herd where decision rules based on minimum BCS thresholds and time to next calving were applied to dry some cows off, curtailing some lactations.

The study has shown the viability of this EL system and the data can be used to indicate impacts on profitability and the environment.

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