Lydney Park Farms Strategic Dairy Farm Workshop 22 March 2024

Summary

The objective of this workshop was to identify realistic key performance priorities to improve the overall resilience of LPDF over the next 3 to 5 years, while describing a plan of adoption for practices to deliver these improvement targets. The SDF steering group have recommended that the farm should target to retain 40% of revenue generated, equivalent to an annual average CFP of 15 to 20 p/l as part of the SDF project based on the adoption of the following practices to deliver these improvements:

- Reseeding underproductive swards- 15% of the milking platform needs to be reseeded each year to perennial ryegrass and medium leaf size white clover pastures using min-till cultivation methods to increase pasture production capability on the farm
- Improving soil fertility –can yield up to 2 t of additional pasture production annually thereby reducing total purchased feed costs by 1.5 p/l while increasing N use efficiency from 22 to35%.
- Total N surplus should be reduced from 168 kg/ha in 2023 to 100 kg/h across the overall farm via the incorporation of clovers within swards, reducing concentrate use levels and crude protein contents, further improvements to soil fertility and increasing slurry use on out blocks.
- The incorporation of plantain with grazing pastures – incorporating plantain using reseeding and over sowing pastures can be an effective additional measure to reduce N losses.
- Making best use of slurry - the use of trailing shoe slurry application methods can significantly lower emissions while building soil fertility and pasture production levels across the farm.
- Maximising sustainability bonuses within milk supply contracts - LPDF should aim to evaluate and maximise bonuses undertaking as many of the various actions as possible to increase farm revenue while demonstrating the capability of high profitability pasture based dairy farming.
- Improve milk quality - an increased frequency of milk recording and, in particular, an earlier initial milk recording during March can identify new infections earlier and facilitate more effective treatment to reduce spread of mastitis infection within the herd.
- Improve herd age profile –all animals should be metrichecked in advance of the breeding season and heifers should be weighed monthly to realise target weight for age and achieve higher conception rates at breeding and subsequent animal performance within the herd.
- Further investment in improved grazing infrastructure in merited - new laneways and spur roadways, additional improvements to the water supply network, individual electronic animal ID and drafting facilities and a comprehensive cost benefit analysis of investing in a 60-point rotary milking parlour should be undertaken

Overview

Lydney Park Dairy Farm (LPDF) is a well-known 640-hectare dairy farm located on the 1125 ha Lydney Estate in the Forest of Dean district of Gloucestershire. As part of the estate, LPDF must be a profitable and resilient business which showcases sustainable pasture-based dairy farming, provides the highest standards of animal health and welfare and an enjoyable and rewarding workplace while also being a valued part of the local community. The farm has a proud heritage as a local employer of choice and as an accessible entry point for non-farming communities to observe and engage with

a modern high performance dairy farm business. The farm is located on the land bank of the river Severn near Lydney Harbour within an estate comprised of fertile soils and a rich and diverse Gloucestershire landscape. In 2023, the farm was selected as one of 10 strategic dairy farms (SDF) across the UK to work with AHDB to develop and showcase best practice dairy systems. Strategic Dairy Farms give farmers the opportunity to benchmark their own businesses, both physically and financially against key performance measures and to identify and target areas to improve their own farm results. The overall aim of the project is to improve farm business resilience and futureproof these important rural indigenous businesses to be more competitive and sustainable over the longer term.

The objective of this workshop was to engage both the farm team led by Keith and Gavin and a wider SDF steering group to review the physical and financial performance data for LPDF, and subsequently, to identify realistic key performance priorities to improve the overall resilience of LPDF over the next 3 to 5 years, while describing a plan of adoption for practices to deliver these improvement targets.

The Farm Environment – Soils and Local Freshwater Characteristics

The dairy farm is comprised of 537 ha of effective farm area (300 ha milking platform and a 237 ha young stock support area). The milking platform at LPDF has a loam clay flood plain soil classification with a high groundwater table and with 25 cm of topsoil on top of heavy clay resulting in a moderate overall drainage status. The remaining lands are free draining with loam soils ranging from 10 to 30cm of topsoil. The farm is located on the land bank of the river Severn as part of the Forest of Dean Severn catchment along the Warth Brook to source subcatchment. At 2m above sea level, flood barriers have been installed to protect the grazing platform due to its proximity of the tidal river. The Severn Estuary is one of the UK's most valuable unique environmental resources combining an intertidal zone of mudflats, sandbanks, rocky platforms and saltmarshes. The habitat is the largest of its type in the UK and supports internationally important numbers of waterfowl, large numbers of aquatic invertebrate populations while also providing a valuable corridor for migratory fish. The estuary is naturally highly turbid due to its physical shape, tidal regime and flow rates and the availability of fine sediment for resuspension. Within the Severn river basin district, 80% of the land area is in used for agriculture and forestry including beef and sheep farming, large-scale dairy farms, coniferous forestry plantations and some arable and specialist horticulture while almost 40% of the land area is covered by Nitrate Vulnerable Zones.

In terms of nutrient challenges, the Warth Brook to source sub-catchment is currently of moderate overall ecological status (Cycle 3, River Basin Management Plan) with low macrophytes and phytobenthos communities (EA, 2024). The Severn estuary provides one of the highest UK inputs of nitrogen (N) and phosphorus (P) to the marine environment, reflecting the estuary's size, the location of human settlements and the intensity of nearby agricultural land use. The levels of most contaminant inputs (including metals, organo-metals, hydrocarbons, nutrients, fungicides and pesticides) to the estuary are much lower than they were in recent decades, following the closure of major industries and the introduction of stricter pollution controls resulting in improvements to both overall water and sediment quality. Nonetheless, there remains a number of important threats to river water quality. Concentrations of dissolved inorganic N are reported to have doubled over the

past 20 to 25 years. Latest evidence indicates that nearly 70% of waters in the Severn river basin district are at less than good status, according to the requirements of the Water Framework Directive. The most significant water management issues for the river basin district are pollution from rural areas (especially from agriculture) which affects 32% of waters; pollution from waste water, affecting 32% of water bodies; changes to the natural flow and level of water, affecting 19% of water bodies; and manmade alterations that affect nearly a quarter of the water bodies. Like many other river catchments in the UK, the effects of climate change are expected to negatively affect river water quality particularly in the upper parts of the estuary as freshwater flows are affected by increased winter precipitation and more frequent summer soil moisture deficits.

LPDF Farm system characteristics

From 1997 until 2007, LPDF ran a fully housed, three-times-a-day milking herd of Holstein cows. In an effort to increase profitability, a pasture-based system was adopted and the herd were mated with Jersey genetics to create a more suitable cow for grazing systems, improve herd fertility and increase milk solids production. A low-cost grass-based spring calving system was adopted with arable land from the estate was resown to grass to suit the increased number of cows, which reached 800 in 2013. With long-standing times at the pre-existing 32-point rotary parlour, the farm system switched to once-a-day milking, with cow numbers peaking at 1,000 during the next decade. More recently, LPDF have switched back to a twice-a-day milking system and reduced cow numbers to 850 to maximise overall productivity while maintaining multiple herds to reduce the length of time the herd spends on concrete each day. The current farm system is described in Table 1 below based on 2023 data in comparison to target values for spring block grazing systems while the farm map is also supplied (Appendix 1).

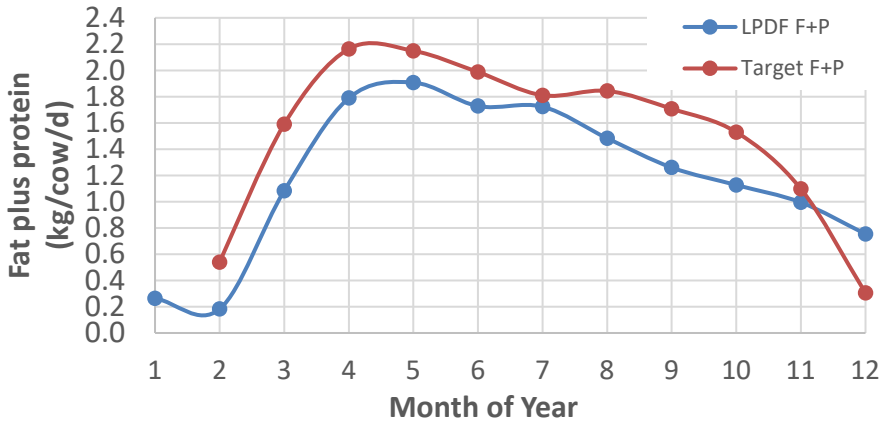
Table 1. Physical performance characteristics for Lydney Farm compared to target values for spring block calving systems.

Physical Analysis	**Lydney 2023**	**Targets**
Herd Genetic Potential (£ Spring Calving Index)	192	160+
42day calving rate (%)	86	90
Pasture grown (T DM/ha – milking platform)	13.0	14 - 15
Pasture utilised (T DM/ha – milking platform)	10.5	12 - 12.5
Concentrate fed (kg fwt./cow)	900	<750
Stocking rate (lu/ha)	2.0	2.3 - 2.5
Stocking rate (lu/ha milking platform)	2.7	2.7 - 2.9
Milk production (litres sold/cow)	4,533	6,000
Milk production (litres sold/ha farmed)	7,911	14,000
Fat plus protein (kg sold/cow)	415	500
Fat plus protein (kg sold/ha farmed)	724	1,250
Milk fat composition (%)	5.12	>4.90
Milk protein composition (%)	3.77	>3.90
Mean Somatic Cell Count ('000)	213	<100

As a spring block-calving farm, compact calving during 10 weeks based on excellent herd fertility are the main drivers of efficiency alongside increasing the proportion of the total diet from grazed grass. The herd has a long history of elite genetics which has been adapted to suit the system and now ranks among the top herds in the UK for pasture-based spring calving systems based on the Spring Calving Index (SCI). On that basis, the herd 42 day calving rate is good at 86%. The farm has an excellent history of consistently measuring pasture data and, with average pasture production at 13.0 t DM per hectare on the milking platforms during 2023 (Appendix 2 and 3), high levels of pasture utilisation are being achieved on the farm over a long grazing season. Consequently, supplementary concentrate feed usage provides less than 20% of the overall animal diet. Given that the milking platform pasture production is 13.0 t DM/ha, and allowing for 750-900 kg of concentrate supplementation, the overall herd size and farm stocking rate are appropriate for a highly efficient grazing system, while further increases in pasture productivity may allow for further reductions in purchased feed requirements (Appendix 4).

Currently (2023), milk production sales levels on the farm average 4,533 litres per cow and 415 kg of fat plus protein with relatively high fat and protein milk composition derived from the elite Spring Calving Index (SCI) crossbred herd. While weather conditions during 2023 were far from ideal for pasture-based production systems (in particular due to unseasonal high rainfall during March and autumn together with soil moisture deficits during early summer), nonetheless, the overall level of productivity of the herd is substantially below optimal levels for spring calving systems. Figure 1 below compares the seasonal milk fat plus protein supply levels for LPDF during 2023 to a target supply expected for elite spring calving grazing systems based on research herd performance (500 kg fat plus protein/cow based on a concentrate supplementation rate of 500 kg per cow). The comparison indicates that mean daily milk fat plus protein sales are below desired target levels for most of the year despite annual concentrate supplementation levels being higher than target values.

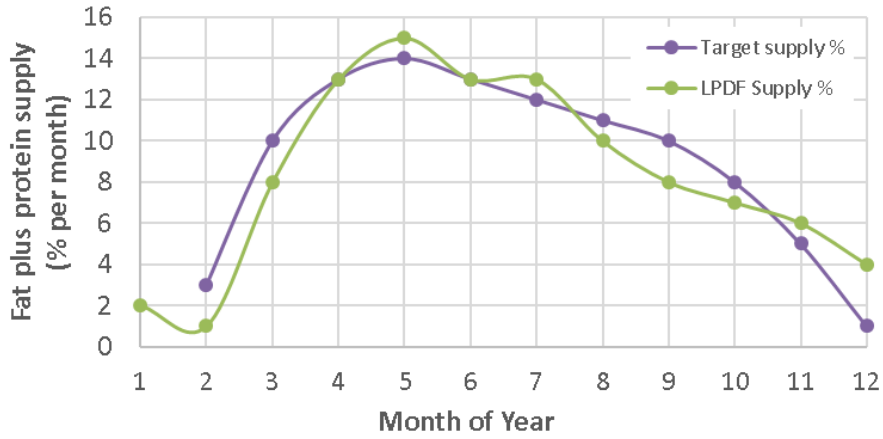
Figure 1. Milk fat plus protein supply for Lydney Park Dairy Farm (LPDF) compared to target values for compact spring calving systems.



Given the low over level of peak milk production and poorer persistency of lactation in comparison to target values, a further evaluation of pasture quality during the grazing season is required to elucidate the factors reducing performance. As the farm currently participates in the AHDB Forage for Knowledge programme, a comparison of pasture quality on LPDF with other similar grazing dairy farms is merited. Figure 2 below describes the profile of milk fat and protein sales from the farm

during 2023, once again compared to typical seasonal values. The comparison in Figure 2 indicates that the profile of milk supply is similar to target levels albeit with lower than expected supply during February and March and again during early autumn. The comparisons presented in Figures 1 and 2 are compared to target research values which are also achieved on a very small proportion of grazing dairy farms. The comparisons are indicative of the substantial potential to further increase productivity from within the pasture-based system at LPDF to increase farm profit margins. While output levels in isolation are no guarantee of increased farm business profitability, nonetheless, the combination of improved animal performance from pasture utilised on farm can substantially improve overall business resilience, and therefore, the identification of key actions to harness some of that additional potential was a critical consideration at the workshop.

Figure 2. Milk fat plus protein supply profile (% by month) for Lydney Park Dairy Farm (LPDF) compared to target values for compact spring calving systems.



Financial performance review 2023

The financial performance of LPDF is compared to contempories within spring block calving systems during 2023 using Comparable Farm Profit (CFP). As evidenced by the summary financial data presented for 2023, total farm income during 2023 was 2.6 p/l below the average of contempories and 5.8 p/l below that being achieved on top performing farms. The reduction in overall income is comparison to contemporaries can be attributed primarily to reduced stock sales from LPDF due to TB restriction At the same time, overall costs of milk production on LPDF are above industry comparison levels. In terms of the principle milk production costs, and in order of overall importance. A large cost area for the farm is feed costs which represents 25% of total operational costs. When concentrate and mineral purchases are taken together with purchased forage costs (an additional spend of 0.7 p/l which appears large in the context of the overall farm stocking rate which should be self-sufficient for forage production), total feed related costs are 10.3 p/l which is higher than contempories (+1.2 p/l) within spring block calving systems. The third largest cost to the farm business is contractor costs which are again considerably above contempories (+2.3 p/l). While chemical N fertiliser usage levels are not high for pasture-based grazing systems (158 kg N/ha) and minimal P and K have not been applied during 2023, nonetheless, total fertiliser costs are higher (+1.2 p/l) than other spring block calving farms during 2023. Finally, veterinary and animal health, repairs to land and buildings and parlour service costs are all above contempories comparisons (+0.7, +0.6 and +0.5 p/l, respectively). Despite low depreciation and leasing charges, total

operational costs are more than contempories and this reflects the largest threat to the long term resilience of the farm business.

The remaining focus of the workshop was on the prioritisation of key actions to improve both profitability and sustainability on the farm while simultaneously improving animal health and welfare outcomes, creating a more enjoyable workplace run by a happy highly motivated team and producing high quality milk within systems which are highly regarded by consumers and wider society at large. As a first step, the sharing of CFP data with the farm team and stakeholder group and building buy in is an important stepping stone to target improved business financial performance. As a general point, it was also considered that LPDF should consider joining a purchasing group to reduce costs of inputs across the business.

The remainder of the workshop review will address these key actions under four headings derived from the steering group consultation namely; feed supply and soils, environmental sustainability, animal health and genetics and farm infrastructure. While farm business profitability is a critical consideration within this review, it was not isolated as a specific topic but instead considered within each of the 4 topics discussed.

Towards a more resilient feed supply based on a reliable high quality forage base

One of the main perceived strengths of LPDF was the large milking platform and historically high pasture production (often exceeding 15 t DM/ha) achieved at the site. In recent years, by virtue of wetter winters and soil moisture deficits during summer, pasture production levels on the milking platform have reduced and correcting this decline is considered a primary opportunity to increase animal performance while simultaneously reducing milk production costs on the farm. On that basis, the following actions are recommended as part of the SDF plan:

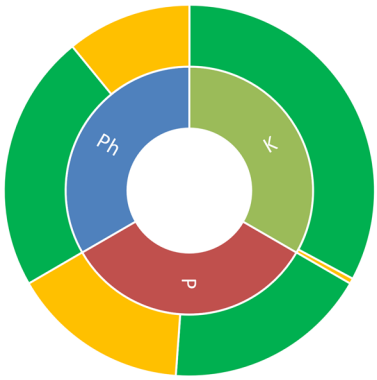
1. Reseeding underproductive swards

Based on a review of pasture data, 15% of the milking platform needs to be reseeded each year using min-till cultivation methods to increase pasture production capability on the farm. While many of the steering group members are open to the possibility of a more diverse seed mixtures incorporating grasses, clovers and herbs (primarily plantain and chicory), the consensus from the group was that the establishment of pastures containing perennial ryegrass and medium leaf size white clovers were fundamentally important to reduce dependence on chemical N fertiliser and to reduce the associated GreenHouse Gas (GHG) emissions associated with their production. The long term objective for the farm should therefore be to achieve swards with a mean annual weighted contribution of 75:25 from ryegrass and clover and to reduce chemical N fertiliser usage levels to less than 100 kg N/ha per year on these swards. In addition to fertiliser N saving, recent research indicates that the incorporation of clovers within ryegrass pastures can increase animal performance (+10%), thereby increasing net farm profitability by £450 per hectare per year and reflecting a substantial short term economic return to the farm.

2. Review and correct farm soil fertility status

The successful creation of vibrant ryegrass clover pastures and more generally improved pasture productivity and nutrient use efficiency across the farm will be predicated on achieving improved soil health and fertility. Between, December 2024 and January 2025, all paddocks on the farm should be soil tested to identify areas requiring additional liming and P, K and S application. Given that the farm has increased herd size in recent years, offtakes of P and K have increased and so the successful establishment of new swards will require optimum basic soil fertility. Presently, based on existing soil test results, 33%, 46% and 1% of milking platform area appear inadequate for pH (6.3), P (soil index 2) and K (soil index 2), respectively (Figure 3). Where new swards are being established, 40 kg of P and 80 kg of K per hectare should be applied at the time of reseeding to establish the new sward. Thereafter, annual maintenance applications of 20 kg of P, 40 g of K and 20 kg of S per hectare will be required to maintain soil fertility levels and maximise pasture production and nutrient use efficiency within new swards. From an economic and environmental perspective, improving soil fertility across the dairy farm can yield up to 2 t of additional pasture production annually thereby reducing total purchased feed costs by 1.5 p/l while increasing N use efficiency from 22 to35% thereby facilitating reductions in chemical N application and minimising the risk of nitrate leaching to ground waters.

Figure 3. Soil fertility profile for pH, P and K on the Lydney Farm Milking Platform (optimum values in green; suboptimal values in orange).



Improving environmental sustainability

In addition to the above measures which contribute to improved environmental sustainability, and given the proximity of the farm to the Severn river, the group believe that LPDF should be a flagship for improved environmental sustainability dairy farm practices. A farm specific nutrient management assessment is required which identifies catchment and soil type specific priorities and include the following key elements:

1. The identification of farm specific point source risk hazards

Farmyard infrastructure makes a significant contribution to agricultural nutrient load management and the protection of waterbodies on grassland farms. Several farm and catchment-scale

longitudinal surveys of nutrient concentrations across river and drainage networks have detected elevated P and N in both water and bed sediment in watercourses and artificial drains that receive farmyard discharges. Nutrient losses from farmyards typically become more impactful during summer months when diffuse losses are suppressed. Farmyard mitigation measures can reduce the quantity of slurry, soiled water and effluents generated. Based on a farm assessment of critical farm infrastructure and farm specific nutrient loss risks; a plan of farm infrastructure improvement actions can be developed including requirements for animal housing and management, nutrient storage, separation of clean and soiled water, design of roadways and exclusion fencing to minimise losses and protect adjoining water bodies (rivers, lakes, streams etc.). While the LPDF has planned to invest in increased winter slurry storage, the identification of critical landscape features which can separate clean and dirty water and minimise nutrient runoff can be a cheap and highly effective mitigation to nutrient losses from LPDF and should be undertaken as a priority.

2. The calculation of N and P surpluses for LPDF

Efficient management of N and P on grassland farms is critical as a source load reduction measure to reduce nutrient loss to water. The farm-gate N and P balance are the main balances used due to their relative ease of completion and provide a useful tool that can be used to estimate nutrient losses from the farm. Previous studies have indicated that between 50 and 80% of calculated N and P surplus can result in leaching, runoff or atmospheric emissions to natural ecosystems with N-leaching increasing linearly as N and P surplus increases. In the case of LPDF during 2023, total N and P surplus were 168 and 9 kg/ha, respectively across the overall farm (Table 3). While the surpluses observed are similar to typical values for pasture-based dairy farms, the N surplus, in particular is likely to result in increased N losses (in terms of nitrous oxide and ammonia emissions and nitrate leaching). Consequently, it is recommended that N surplus should be reduced to 100 kg N/ha.

The primary opportunities to reduce N surplus on the farm are via:

- the incorporation of clovers in the grazed swards allowing for significant reductions in both chemical N fertiliser application and summer concentrate supplementation levels based on growing more higher quality pasture, resulting in increased animal intake and subsequent performance and a reduced requirement for mid-season concentrate supplementation. This could reduce N inputs and surplus by 40 kg N/ha.
- reducing concentrate use levels and crude protein contents. In 2023, all of the concentrates purchased by LPDF were either 16% or 18% crude protein contents, whereas recent studies indicate that reducing concentrate crude protein content to below 14% during the grazing season has no detrimental impact on animal performance and could reduce overall N surplus per hectare by 10 kg N/ha.
- further improvements to soil fertility. Based on the soil tests observed, 33%, 46% and 1% of milking platform area appear inadequate for pH (6.3), P (soil index 2) and K (soil index 2), respectively while only 33% of the milking platform is adequate for all 3 parameters simultaneously. In addition, sulphur levels also appear low which could further restrict the capacity of the free draining parts of the platform and out block soils to remain healthy during summer dry conditions. On that basis, the application of 20 kg of P and S per hectare per year is recommended on the milking platform to boost pasture production while reducing N inputs.

Similarly, the majority (90%) of the heifer and outside lands appear low in pH, P, K and S which is also likely to significantly reduce pasture DM production on these areas resulting in increased purchased forage requirements for the farm. On that basis, the application of 20 kg S/ha per year on the outside land areas is recommended in addition to the application of 2t lime per acre on any paddocks below pH 6.3. It is also recommended that the possibility of exporting slurry to these outside land areas is reconsidered to improve background soil fertility (and K levels in particular) while also simultaneously reducing the nutrient load burden on the milking platform. Further improvements in soil fertility within the farm have the potential to improve N recovery resulting in lower chemical N application requirements and increased N use efficiency (from 22% to 35%).

Table 3. Nutrient management characteristics for Lydney Park Dairy Farm (LPDF) compared to target values for spring block calving systems.

Nutrient management characteristics	**LPDF 2023**	**Targets**
N surplus (kg/ha)	168	<100
P surplus (kg/ha)	9	5-10
N use efficiency (%)	22	>35
P use efficiency (%)	45	>75
Optimum soil fertility (pH, P, K; %)	25	>90
Chemical N applied (kg N/ha Total farm area)	158	100
Chemical P (kg P/ha Total farm area)	0	20
Chemical K (kg K/ha Total farm area)	0	40
Chemical S (kg S/ha Total farm area)	0	20

3. The incorporation of plantain within grass clover pastures to reduce N losses

Pastoral systems are relatively inefficient in cycling N through the plant–soil–animal components with only about 20% to 35% of the N entering the system being converted into animal products. Emerging international research evidence is indicating that the incorporation of plantain in grazing dairy swards can significantly reduce the risk of nitrate leaching on free draining soils while also increasing animal performance within grazing systems. Ribworth plantain is a naturally occurring forage herb in the UK that contains a range of bioactive compounds which can inhibit a range of rumen and soil N cycling processes resulting in increased rumen N efficiency and reduced soil nitrification and mineralisation and ultimately, resulting in reduced N loss from grazing systems. Recent ongoing studies in both Ireland and other countries suggest that pastures containing 10% plantain can maintain similar DM production, increase animal performance and reduce N leaching by 7-10% on typical free-draining soil types where N loss is most problematic. As a demonstration to other farmers, the group were of the considered view that some of the better performing existing pastures on the farm could be over sown with both medium leaf white clovers and plantain to further accelerate the adoption of lower chemical N swards while also evaluating the potential additional contribution from herb incorporation on some paddocks on the farm. On that basis, the incorporation of plantain within reseeding and over sowing protocols to maintain an effective proportion in the sward can be an effective additional measure to reduce nutrient losses for grazing systems.

4. Slurry management

Making best use of slurry on-farm to build soil fertility and minimise chemical fertiliser requirements is an essential grassland management practice on modern high performance dairy farms. To further improve environmental sustainability and, given the planned investment in additional slurry storage, the application of 25,000 l of slurry per hectare on all paddocks farmed and not just the milking platform should be targeted during the grazing season to replace an additional application of chemical N. The most environmentally benign methods of slurry application are injection or trailing shoe application resulting in significantly lower Ammonia and Nitrous Oxide emissions and these should become the recommended application methods going forward in preference to dribble bar applicators.

5. Maximising the use of sustainability bonuses within milk supply contracts

LPDF has a milk supply contract with First Milk which promotes more sustainable practice and provides additional bonuses for actions undertaken to improve sustainability on dairy farms. As part of the contract, LPDF should aim to evaluate and maximise these available bonuses and undertake as many of the various actions as possible to increase farm revenue while demonstrating the capability of high profitability pasture based dairy farming to meet consumer expectations.

Animal health and genetics

In terms of animal health and welfare, an elite herd has been created on the farm which is an excellent basis for high animal health status to be achieved. As with all pasture-based dairy systems, minimising involuntary culling via high submission rates and 42 day calving rates and minimised empty rates are critical to maximise animal performance while utilising more pasture on farm. Among the main animal health concerns for LPDF, mastitis, herd infertility and lameness are the primary considerations and the following key actions were identified which can reduce animal health risks on LPDF.

1. Reducing mastitis incidence and associated costs.

In comparison with target values, overall Somatic Cell Count (SCC) and Total Bacterial Counts (TBC) on the farm were high during 2023 (Table 4). Based on a review of milk payments to LPDF, milk penalties reduced milk receipts by £27,400 during 2023 (equivalent to January milk sales or 2% of total annual supply value) and therefore mastitis incidence (clinical and subclinical) and TBC are costing LPDF in terms of significantly reduced revenues. The group believe that an increased frequency of milk recording and, in particular, an earlier initial milk recording during March can identify new infections earlier and facilitate more effective treatment to reduce spread of infection within the herd. In addition, a more defined role must be given to someone within the farm team to closely monitor recent infection rate and communicate with other members of the team when spikes in mastitis occur to ensure that appropriate steps are taken to treat and cure cases and minimise associated milk loss to the farm business. As mastitis instance seems to be weather related, ensuring that animal standing time on concrete is minimised and roadways and animal collection areas are clean and dry underfoot can reduce the risk of the spread of infection.

Table 4. Review of Somatic Cell Count (SCC) and Total Bacterial Counts (TBC) at Lydney Park Dairy Farm (LPDF) compared to target values during 2023.

Mastitis incidence	**Lydney 2023**	**Targets**
Mean SCC ('000)	213	<100
Mean TBC ('000)	43	<10

2. Herd fertility

While LPDF is rearing the desired number of replacement animals, the overall maturity of the herd is below target values resulting in significantly reduced milk production performance (Table 5). To improve overall herd fertility, all animals should be metrichecked in advance of the breeding season. Moreover, heifers should be weighed monthly to realise target weight for age and achieve higher conception rates at breeding and subsequent animal performance within the herd. It was also suggested that the elimination of bulls together with a 10 week breeding period from AI should be the target for the farm thereby eliminating late calving low performance animals from the herd.

Table 5. Lydney Park Dairy Farm dairy herd maturity compared to target values for spring block calving systems.

Animal longevity indicators	**LPDF 2023**	**Targets**
Maiden heifers reared (%)	23	<25
Herd age profile (% Lact 1)	21	<20
Herd age profile (% >3 lact)	39	>45
Herd age profile (Ave Lact. No.)	3.4	>4.0

3. Reducing lameness incidence

To minimise animal performance and wastage associated with lameness, mobility scoring every 6 weeks should be routine practice for the herd with further investments made in roadway surfaces to minimise lameness, eliminate any standing water and improve cow flow.

Farm infrastructure and work organisation

Improving farm infrastructure was considered as one of the main opportunities to reduce costs of milk production and workload while simultaneously increasing animal performance and farm business profitability. While planning consent has been granted and grants are being applied for additional slurry storage on the farm, the following additional infrastructure requirements were priorities by participants at the workshop:

1. Further investment in improved grazing infrastructure

In addition to improved soil fertility and reseeding of unproductive pastures, an additional 500-1,000 m of new laneways and spur roadways are required to improve access to specific paddocks during

inclement weather conditions. In addition, a further 6 paddocks on the grazing platform require additional deep drains to remove surface waters quickly. Finally, improvements to the water supply network are required on both the dairy cow and young stock areas, including the raising of water troughs to reduce the risks of badger access. These works are inexpensive and should be undertaken once weather conditions allow during 2024.

2. Individual Electronic Tagging and Drafting facility

For the general purposes of working with large numbers of animals, improving cow flow and accurate data recording in particular around animal health, hoof care and animal breeding, all animals in the herd should have electronic identification (EID) tags provided while a drafting system needs to be put in place during this season. This will reduce workload, increase recording accuracy and facilitate improved cow flow from the milking parlour and should not be delayed while the future of the milking parlour is being considered. Highly efficient drafting systems are incredibly accurate and relatively inexpensive and can be moved later as maybe required to facilitate a new milking parlour with minimal additional cost.

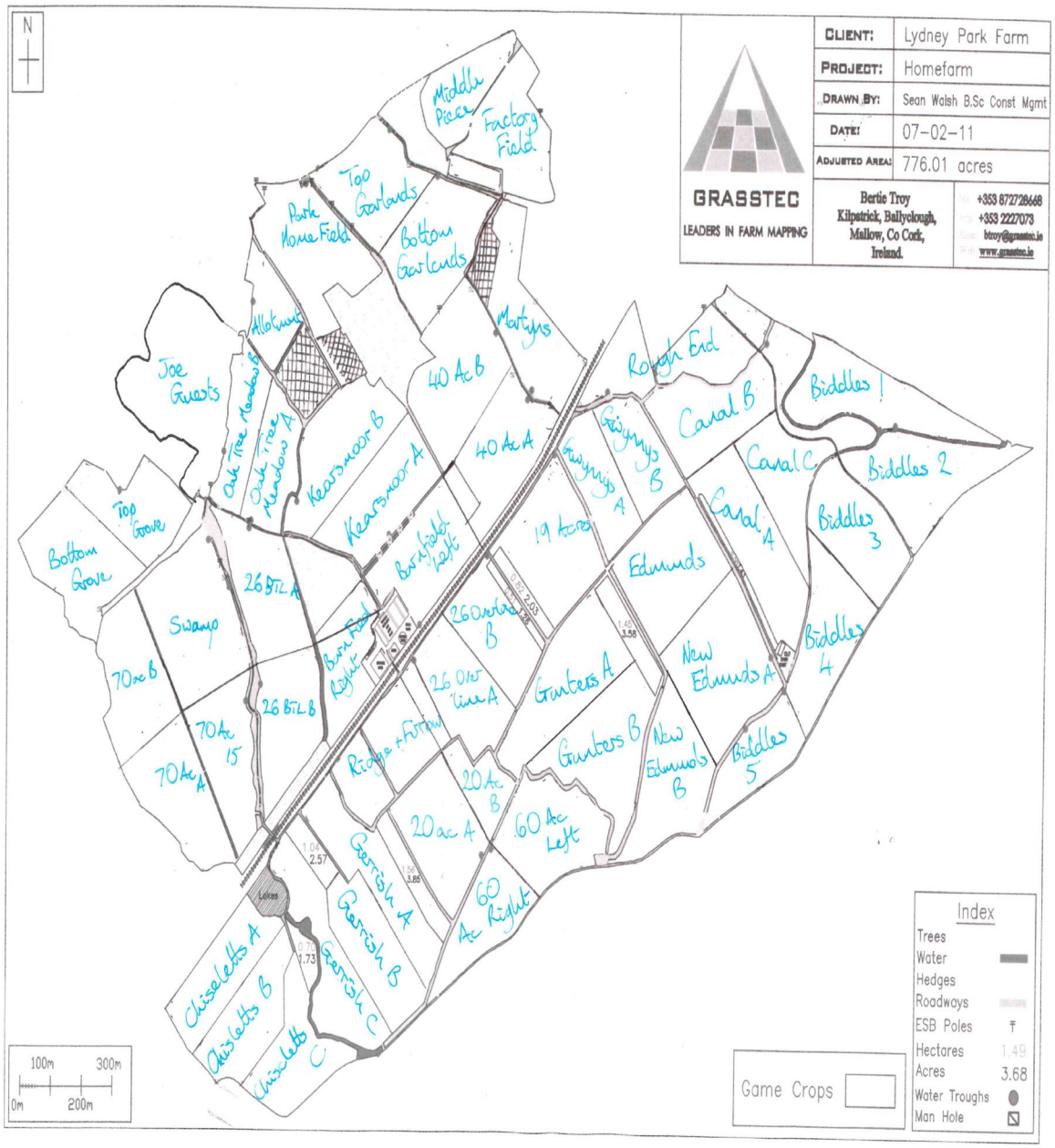
3. A cost benefit appraisal of a rotary milking parlour

Given the scale of the herd, the requirement for additional relief labour and the potential for improved animal performance, the cost benefit analysis of investing in a 60-point rotary milking parlour should be immediately undertaken based on expert advice. It was the view of the group that the current performance of the herd is substantially affected by milking times and, given the farming scale, the significant investment required (£1.5 million approximately) should be thoroughly investigated based on a live business plan as a matter of urgency. Such a facility would have considerable benefits for the dairy herd in terms of cow flow and milking efficiency, the farm team in terms of workload and milking time and the overall long term performance of the farm business in terms of farm business resilience and attractiveness to perspective future employees. Where the required investment was financed over 20 years, and across the scale of the farm operation, it represents significant opportunity to the farm operation which could cost as little as £250 per hectare per year to the farm operation while returning an additional CFP of in excess of £600 per hectare via improved animal performance, reductions in parlour related costs and reduced workload for the farm team.

4. Young stock accommodation

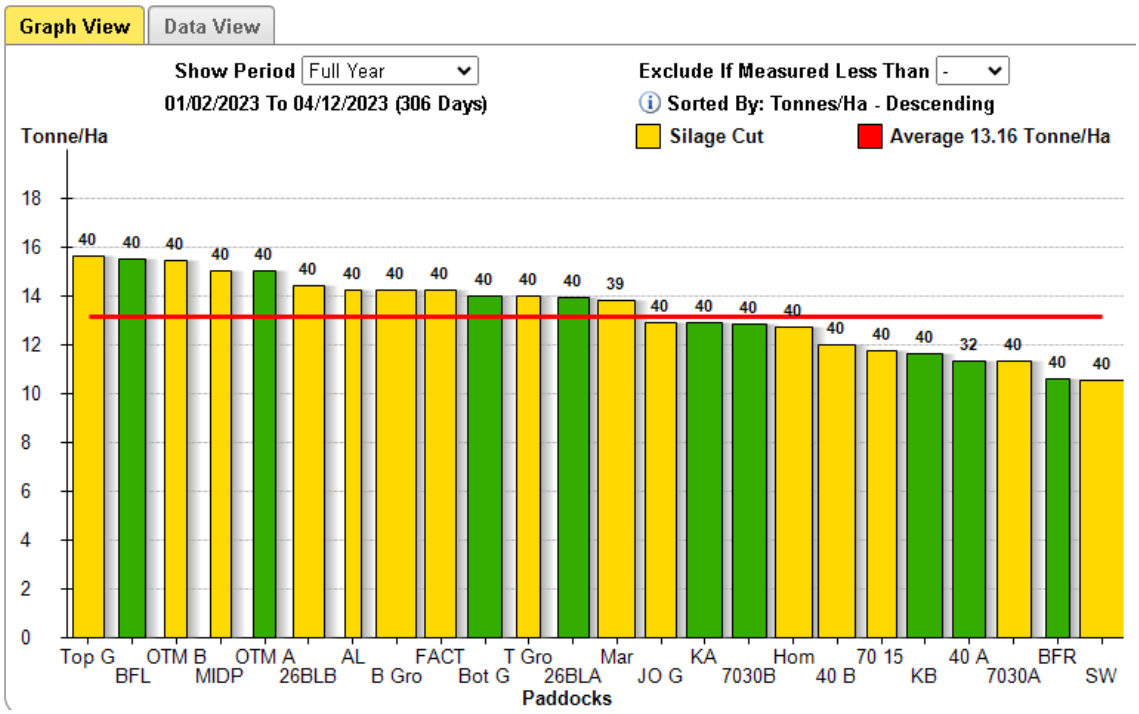
Although some young stock are currently winter grazed resulting in adequate animal performance, nonetheless, the system is laborious and increasingly, heavy rainfall events during winter result in soils becoming liquefied with undesirable impacts on soil structure and nutrient loss risks. Moreover, it is perceived poorly by the general public and therefore should be avoided. On that basis, additional housing for young stock should also be considered to reduce pasture and soil damage during winter.

Appendix 1. Farm map of Lydney Park Dairy Farm

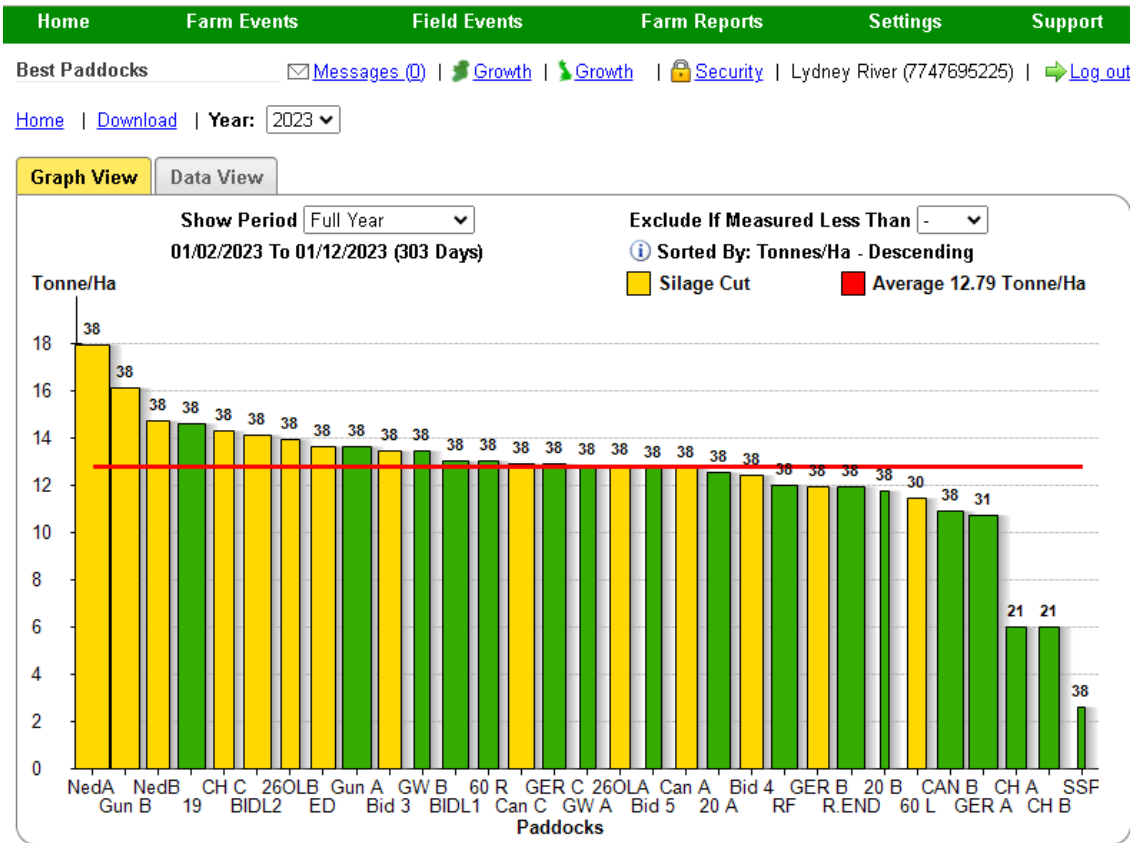


Appendix 2. Pasture production on grazing platforms during 2023

a) Lydney Village Platform

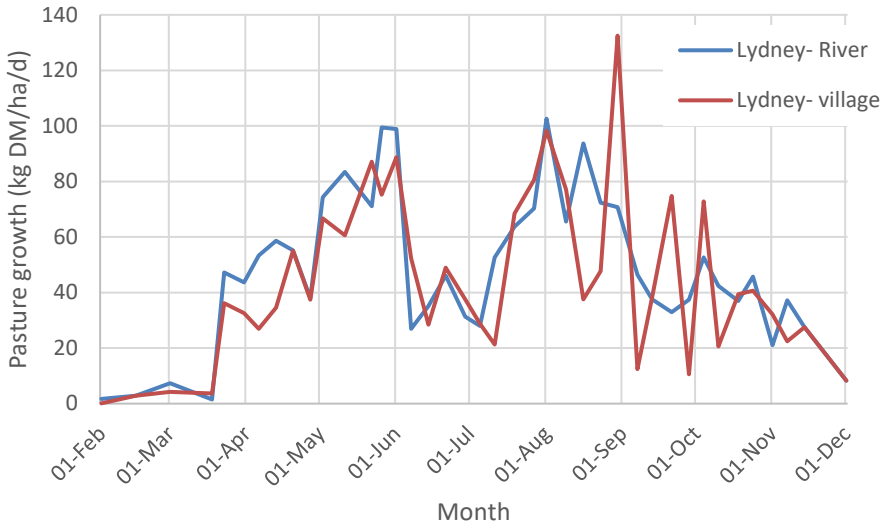


b) Lydney River Platform

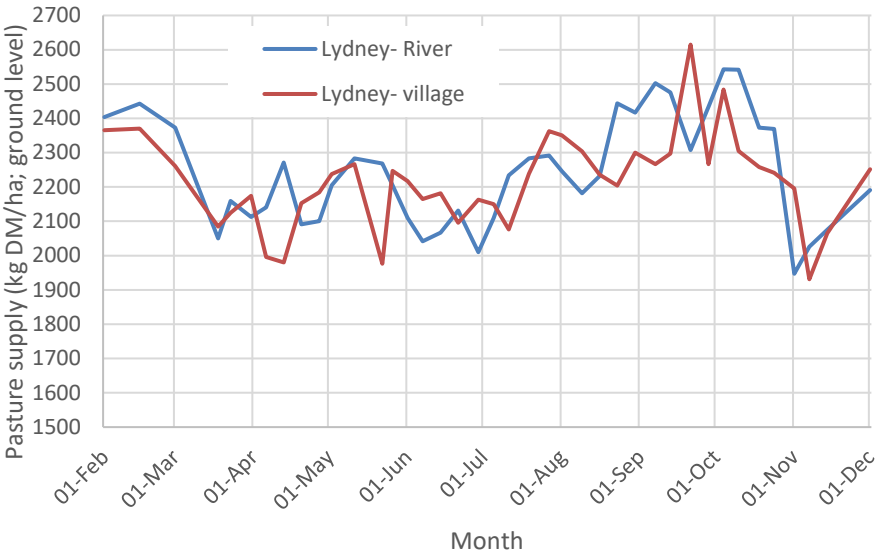


Appendix 3. Grass growth profile for Lydney Grazing Platforms 2023

a) Seasonal pasture growth profile (kg DM/ha/d)



b) Seasonal pasture supply profile (kg DM/ha; ground level)



Appendix 4. Stocking rate evaluation for Lydney Park Dairy Farm

	Lydney Park Farm Feed Budget	
Total (effective ha)	537	
Milking Platform (effective ha)	300	
Outblock (effective ha)	187	
Grass growth (T DM/ha weighted all area)	12.5	
Total pasture grown (T DM)	6088	
Utilisation (%)	0.75	
Total DM utilised (T DM/ha)	4,566	
Replacments	Feed required (kg DM/hd)	No. replacement
repl 0-1 kg/dm May to end Dec T	1,100	250
repl 1-2 kg/dm Jan to end Oct T	2,200	250
Total replacement DM required (T DM)	825	
Total DM available after replacments (T DM)	3,741	
Animal requirements		Feed required (kg DM/hd)
Milk solids (kg/average cows)	470	3,008
Maintainence BW (kg/cow)	550	2,200
Total DM requirements (kg DM/cow)		5,208
Concentrate fed (kg DM/cow)		750
Forage required (T DM/cow)		4.46
Appropriate Herd size (No. cows/farm)		**839**
Stocking Rate (Whole farm)	**1.7**	
Stocking Rate (Milking block)	**2.8**	