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Tywi Farm Nutrient Partnership:
Semi-annual report 2022 (January to June)

Undeb Ewropeaidd
European Union
Llywodraeth Cymru
Welsh Government
Cronfa Datblygu Rhanbarthol Ewrop
European Regional Development Fund

Executive Summary

Recent innovations in dewatering technologies now increases suitability for the agriculture sector. The separation of liquid and solid from dairy slurry is demonstrated to reduce bulk volume, alleviating the pressure on farm storage capacity. Alongside successive wastewater treatment, we have seen overall removal rates of 98.93% Nitrogen (N), 99.98% of Phosphate (P) and 98.53% Potassium (K), in the separation of raw slurry (typically 5.07% total solids) in addition to the treatment of dilute slurry. Capturing these nutrients presents an opportunity to reducing the need for artificial fertilisers. Importantly, this also helps farmers in Wales (and beyond) to meet compliance with recent changes to legislation, such as the Control of Agricultural Pollution Regulations. We have made further investigations into the precision application of the separated fractions, and have welcomed many stakeholders including farmers, AD developers, and government officials to experience the progress for themselves. To further disseminate our work, we have organised an open day on Thursday 15th September 2022, where we'll have working demonstrations, guest speakers, and a slurry management workshop, alongside a tour of the site accompanied with an update of the current projects at the Coleg Sir Gâr, Agriculture Research Centre, Gelli Aur.

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Introduction

Agricultural slurry is a valuable organic manure, concentrated in nutrients essential to plant growth and organic matter which can improve soil health. Effective slurry utilisation has repeatedly been shown to improve overall soil fertility across multiple settings, whilst producing yields equal to (or better) than those gained from NPK compound and standalone N fertilisers [1,2]. Nevertheless, farmers can be left with surplus slurry due to intensive systems of livestock production; land-use changes limiting the acreage suitable for spreading; and the introduction of new regulation such as Water Resources (Control of Agricultural Pollution) (Wales) Regulations which will outright prohibit traditional spreading between 15th October and 15th January, depending on soil/field type [3]. Across the UK, the dairy industry is the single largest producer of slurry and is demonstrated by the ~7.8 metric tonnes produced per farm each day, considering an average herd size of 148 and 53kg of excreta per milking cow [4]. Overall, there is growing need for technologies which help alleviate pressure placed on farm storage, support effective nutrient management, and mitigate the environment impacts associated with traditional storage and spreading.

Dewatering has been shown to reduce bulk slurry volume and the demand for costly artificial fertilisers, and, when coupled with good agri-practice (right amount, right time, right place), it has the potential to reduce pollution such as nutrient leaching and agricultural runoff. A sector-wide review [5] indicated that potential for dewatering is becoming increasingly popular within intensive indoor systems of dairy and beef production. Essentially, it is the process of separating liquids from solids, producing a liquid fraction which can undergo wastewater treatment or be used in irrigation/fertigation, and a solid fraction which can be used as a stable and stackable fertiliser that is higher in dry matter and more nutrient-dense than raw slurry. Since January when we began treating raw slurry, we have a developed a comprehensive understanding of the dynamics within the slurry matrix and how this is affects the dewatering process, and the amount of chemical is required. Our focus is now to reduce plant operational costs by increasing the efficiency of the chemical coagulation/ flocculation (thus reducing the dose required) and increasing the flow rate – both of which we hope will be achieved through an upgrade we have made to the design of the reaction tank, as discussed in more detail later.

Site Overview

Based at the Agriculture Research Centre at Gelli Aur farm (Coleg Sir Gâr), the Tywi Farm Nutrient Partnership is a research collaboration between Welsh and internationally based organisations, each bringing their unique set of skills and industry-leading expertise. As the first further education institution in Wales to receive funding from the European Regional Development Fund SMART Expertise 2014-2020, our connection with N2-Applied, Power & Water, Netafim, GEA, Natural Resource Wales (NRW), Dŵr Cymru, Honesty foods, and Aquatreat, is unique by the fact we are working towards one common goal. This is to create a tried-and-tested nutrient management package through maximising the efficiency of a modular dewatering system and successive wastewater treatment, alongside the integration of precision farming techniques. As demonstrated by the process flow diagram found below (Figure 1), raw slurry is initially fed through a screw press to remove the bulk of the coarse solids (which are taken to solid store) and the remaining liquid (filtrate) held in a transfer tank. The filtrate is then pumped into the reaction tank where the coagulation-flocculation process takes place, binding suspended and dissolved solids together through chemical addition. A decanter centrifuge finally removes these solids through centrifugal force (again, these are taken to solid store), and the remaining liquid is sent to a dissolve air flotation (DAF) unit for polishing. After, the liquid can either be delivered via the drip irrigation system, used to washdown the yard, or sent to the reedbed where the residual contaminants are removed by natural filtration and ecological processes.

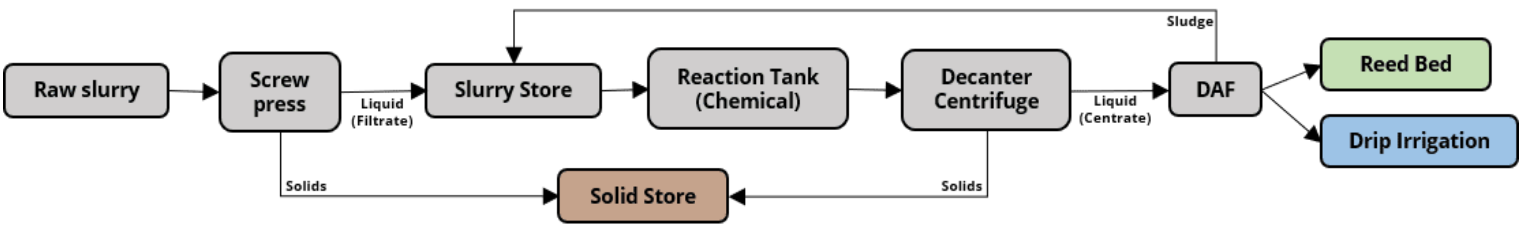

Figure 1. Flow diagram of the dewatering process. Until December 2021, filtrate was place in the slurry store and was diluted with yard/parlour washings, however filtrate now remains undiluted by entering the reaction tank straight after the screw press separator – this represents both ways in which slurry/washing can be store on farm (separately and together).

Recent Developments

We have hosted numerous visits from individuals and various stakeholder groups that share a variety of different interests within the development of our applied technologies. At the start of the year, a sub focus group of the Wales Land Management Forum (WLMF) came to discuss their proposal on planning consent and see first-hand the outcomes so far of the project, in terms of mitigating impact and monitoring water quality. The membership of the group comprises NFU Cymru, Farmers' Union of Wales (FUW), Country Land and Business Association (CLA), Dwr Cymru Welsh Water (DCWW), the Tenant Farmers Association Cymru (TFA), Hybu Cig Cymru (HCC), AHDB Dairy, the Carmarthenshire Fishermen's Federation (CFF), Natural Resources Wales (NRW) and Welsh Government. Shortly after, members of Farming Connect's Agrisgôp management development programme also came for a site visit. We then attended a Low Carbon show at the National Agriculture and Exhibition Centre in Stoneleigh to network with farmers as they move through the agricultural transition.

In April, we exhibited at Dairy Tech (again, in Stoneleigh) to provide advice on nutrient management and disseminate our findings thus far, with an impressive amount of interest received from industry, farmers, and educators – our research was even featured on S4C's Ffermio! We then organised a mutual opportunity for Welsh Government advisors to discuss the suitability of our process within future policy and recommendations. Later in May, an NRW task finishing group visited to help contextualise and develop their policy position statement on the regulation of constructed wetlands (reed beds) which is due to be published to the public late summer. We were also visited by officials from the Department for Environment, Food and Rural Affairs (DEFRA), who came to discover more about innovations within slurry management and to discuss the feasibility of including separation equipment within grant funding schemes available for farmers in England.

During June, we hosted Open Farm Sunday in partnership with LEAF where members of the public came to learn more about dairy production, countryside management, and all the goods and services farmers provide. Shortly after, the team spilt up to attended both The Royal Association of British Dairy Farmers (RADBF) Down to Earth and Innovation and Diversification Wales 2022 which were held on the same day, located near Shrewsbury and Builth Wells respectively. Both had a primary focus on regenerative agriculture, and demonstrated ways to improve environmental health through the uptake of new technology and sustainable agri-practice. Following that, the newly established Four River for LIFE project team visited with thoughts of developing ways of working with farms to protect river corridors and prevent nutrient run-off. Finally, the Economy, Trade, and Rural Affairs Committee with Senedd Constituency Members, visited to see the process for themselves and to discuss our alterative measures proposal we had previously submitted towards the Control of Agricultural Pollution Regulations.

Developments within relation to the plant design have remained similar to our previous report. One key change is the upgrades made to the reaction tank where the slurry and chemicals are blending together (also known as a blending tank). When specifying the design of a reaction tank, we found that in order to increase efficiency and economical use of chemical there are a number of parameters that require careful consideration (such as chemical delivery points, the ratio of the diameter of the mixer impeller to the diameter of the tank, and the position/type/number of impellers, amongst many other variables). Additionally, pH correction should also be included within the design of tank as we found mechanical separation to increase the pH of the separated liquid fraction. Finding the optimum pH range for efficient chemical utilisation has been difficult as, combined with the effect of mechanical separation and the various make-up of the slurry matrix, the metal salt coagulant we apply also lowers the pH of the slurry. It is, therefore, advised that testing should be carried out for each new site to ascertain the best pH for the chemicals specified, in addition to in-line pH monitoring and automatic corrective dosing.

As our infrastructure has now been under refinement and trial, we have been able to produce some provisional operation costs based at our current flow and chemical treatment rate (as further mentioned in the Potential Applications section). Our current aim is to double flow rate at the same time as utilising the same amount of chemical – effectively halving the chemical costs per cubic metre of treated slurry. It is assumed electrical consumption will remain relatively the same.

Mechanical Separation

The screw press and decanter centrifuge are two common forms of mechanical separation, although the former is more frequently used within agricultural settings. Their separation efficiencies have been previously compared on several slurry types including cattle, pig, and anaerobic digestate, and ages thereof. However, this is the first research project where these machines have been applied in unison on dairy slurry. Agreeing with multiple studies, we have so far found the decanter centrifuge to have a higher separation potential for all measured determinants, and is capable of removing much smaller particles sizes. Our most recent trials have been conducted using raw slurry as the feedstock which is 5.07% total solids (TS) (see figure 2 and 3 for nutrient analysis).

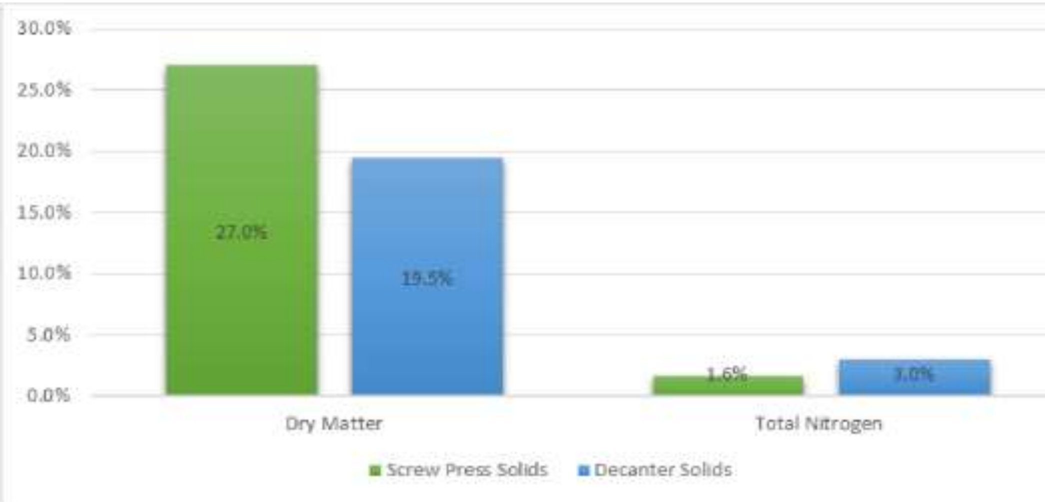

Figure 2. Comparison between solids obtained from the screw press and decanter centrifuge. Separately, screw press solids are much higher in DM content albeit lower in N, possibly indicating that a substantial proportion of inorganic nitrogen is dissolved (and, therefore, chemical separation is needed). Nutrient analysis undertaken and verified by NRM laboratories.

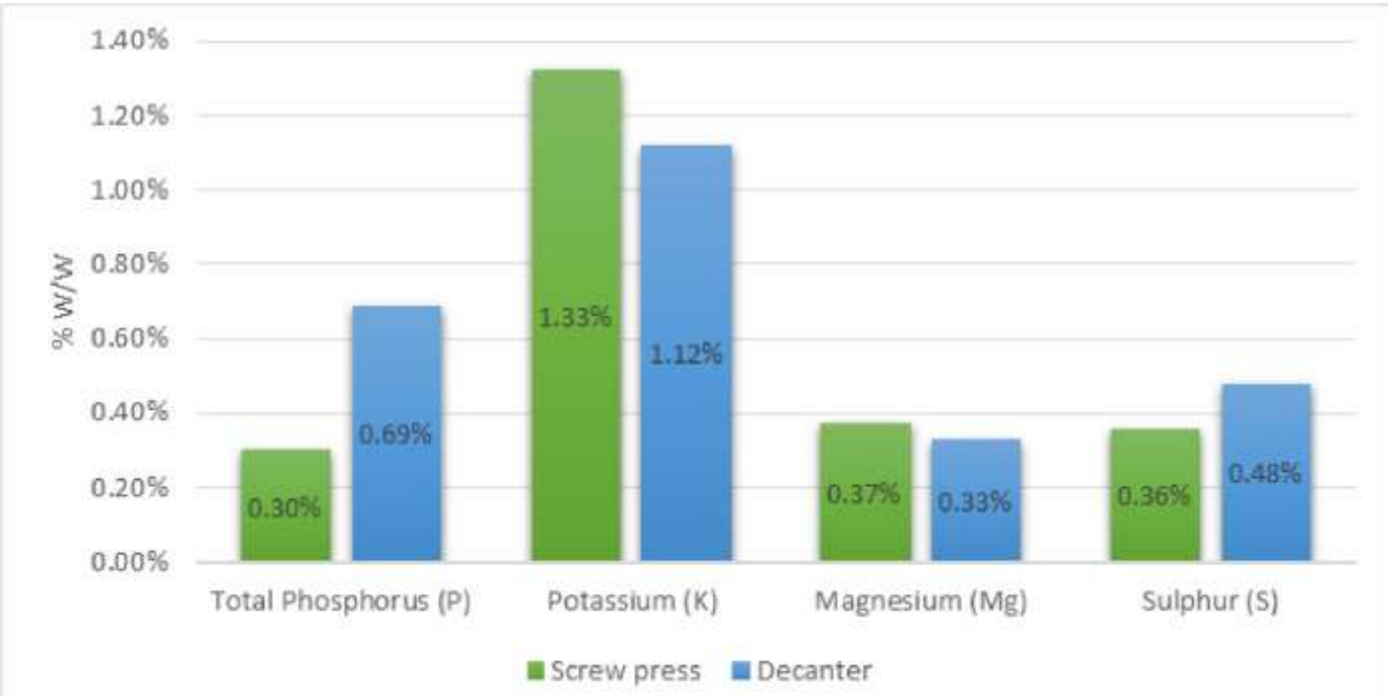

Figure 3. Comparison between several nutrient concentrations within the screw press and decanter centrifuge solids. The screw press is shown to obtain the bulk of these nutrients, nevertheless, the decanter (with chemical amendment) is more effective at removing P and S considering there is a lower concentration of these in the

respective feedstock. These figures were comprised of averaged records obtained from September 2021 to May 2022.

Chemical Separation

Coagulation-flocculation is extensively used as a pre-treatment before mechanical separation in industrial wastewater treatment [6]. It is used to control particulates (i.e., suspended/ dissolved solids, inorganic ions and heavy metals) by the inclusion of chemical coagulants and flocculants (in this instance polyaluminiumchloride and polyacrylamide, respectively). Initial trials at the plant also incorporated the use of ferric chloride; however, difficulties quickly arose when using this product with the DAF (sludge blockages). Reliable floc formation has been a key challenge encounter when using dairy slurry due to the variability of the slurry matrix. Observations taken from the plant and jar testing support the notion that pH is an important but does not appear to be a standalone factor affecting the dewatering process. One potential explanation of poor/inconsistent floc formation relates to the limited capacity to resist acidification (alkalinity) within a feedstock that is highly fluctuating. We found that the addition of polyaluminiumchloride can rapidly change the pH, beyond the optimal ranges for efficient charge neutralisation when using this coagulant. Additionally, when feed is taken from pockets of increased alkalinity, more chemical is required to destabilise the carbonate particles and achieve charge neutralisation. This indicates a stoichiometric relationship between chemical dosage and feedstock alkalinity, which is supported by previous findings made in the literature [7, 8]. By overcoming this challenge, dosing rates are now known for the treatment of both dilute and raw slurry, and provides a basis for a known starting dose rate when making recommendations to other farms (with other slurry types).

One question raised from the combination of a chemical dewatering and mechanical separation process is whether the chemical addition has an effect on the nutrient values within the produced solids once within storage. It is also as equally important to discover what effect separation alone has on the nutrient content of the solids, and how might a storage length similar to the closed period effect this. To answer these questions, one of our researchers has undertaken a research masters in conjunction with Institute of Biological, Environmental and Rural Sciences at Aberystwyth University (Figure 4). Data collection for this research is set to finish within July and a report of any subsequent findings will be available at

Figure 4. The enacted comparison study between unseparated raw slurry, solids obtained directly from the decanter, and decanter solids which underwent a previous chemical treatment (with blue drums containing these three slurry states and replicates thereof). Whilst the decanter alone can obtain the bulk of the nutrients and organic matter, the decanter with chemical amendment has shown to be more effective at capturing more N, P, K, especially those which are dissolved. The bulk density of the slurry and solids vary greatly despite an equal weight of 35kg initially placed in each of the drums – alluding to the overall storability and management of the solids.

DAF units are primarily used in the treatment of sludge from industrial wastewater. The process works by dissolving air under pressure within water, so that, when that pressure is released, small micro bubbles are formed which come into contact with solid particles, sweeping them up to the surface where they form a sludge blanket. There are few instances where DAF units have been previously used in this setting [9], however, given the limited amount of data available, it was important to gradually increase the flow and solid loading to prevent ineffective nutrient capture. Removal rates indicate that this equipment is extremely crucial within the treatment process, and can be visibly noted in the turbidity (cloudiness) of the wastewater (Figure 5). Whilst we are continuing to trial different ways to further incorporate the produced sludge back into the system for better separation and volume reduction (thus increasing overall nutrient capture), we currently feed the DAF sludge into the reaction tank. We found that the unit can cope with a TS loading of ~1%, if feed is higher than this the quality of the outlet is affected.

Figure 5. Difference in turbidity – a comparison between the DAF inlet (left) and outlet.

Incorporating the aforementioned processes (both mechanical/chemical separation and DAF – equipment which is known as the ‘plant’), regular analysis undertaken by laboratories at NRW have shown promising removal rate in a range of nutrients (Table 1). As the removal of these nutrients occurred at the plant (before the wastewater is sent onwards for further treatment in the reed bed), these rates refer to the amount capture/retained with the solid proportion of the slurry.

Determinant	Capture Rate
Chemical Oxygen Demand (COD)	87.52 %
Total Suspended Solids (TSS)	95.51 %
Total Nitrogen (TN)	79.65 %
Total Phosphate (TP)	94.26 %
Dissolved Phosphate (OP)	96.81 %
Total Potassium (K)	64.90 %
Total Aluminium	73.02 %

Table 1. Reduction percentages in a number of determinands recorded at the plant during September 2021 to May 2022, from feed (raw and filtrate) to DAF outlet (subnatant), which have an average TS of 5.07% and 0.61% respectively. Nutrient analysis undertaken and verified by NRW laboratories in Swansea.

Commissioned in 2021, our constructed wetland (reed bed) is an engineered system that uses natural ecological processes of plants and microorganisms (biofilm) to remove a number of pollutants (including pathogens, nutrients, and heavy metals) and reduce chemical oxygen demand (COD). They have been used in traditional farm management for decades, however, what makes this design different from a standard system is the inclusion of forced aeration (Figure 6).

Figure 6. Constructed wetland and the 'beehive' structures which house the aeration pumps that are said to increase the removal rate of COD and organic contaminants, allowing for a faster turnover.

A recent visit from NRW was held to discuss the feasibility of regulating such systems across multiple settings which should be published during the summer of 2022. While the reed bed is still in its infancy, removal rates are expected to increase as the reeds begin to colonise the surface of the gravel. In addition to this, most of the data we have this far collected has been in the dormant winter months and removal rates are again expected to increase during the summer as temperature is a controlling factor when it comes to the activity of both the reeds and the biofilm. Nevertheless, significant reductions in the measured parameters are currently seen across the board, particularly when considering COD and Aluminium (Table 2 and Figure 7).

Determinant	Removal Rate
Chemical Oxygen Demand (COD)	99.94 %
Total Suspended Solids (TSS)	99.98 %
Total Nitrogen (TN)	98.94 %
Total Phosphate (TP)	99.98 %
Dissolved Phosphate (OP)	99.83 %
Total Potassium (K)	98.53 %
Total Aluminium	99.19 %

Table 2. Nutrient removal rates from raw slurry and filtrate (average of 14) to the reed bed outlet (average of 18 records), from September 2021 to May 2022.

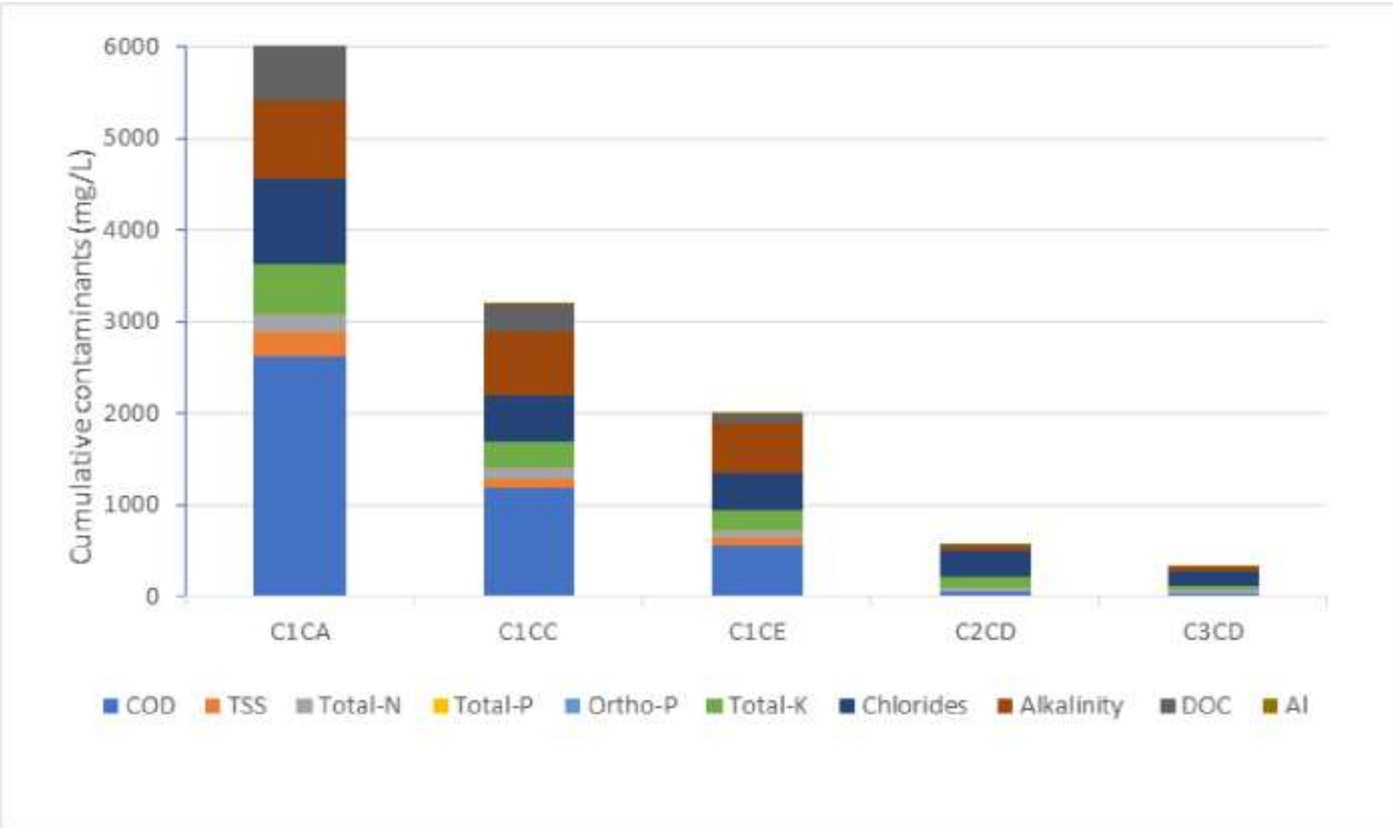

Figure 7. Total amount of cumulative contaminants within progressive cells (i.e., C1CA) of the reed bed, with averages taken from 19, 13, 13, 13, 18 records respectively. These values are dependent on a variety of factors including temperature and input rate (which effects the retention time, i.e., the length of time it takes for the liquid to percolate through and remove the necessary contaminants). Additionally, it is important to note that, as the reed bed in open to contamination from external biological sources, overall nutrient removal levels may be affected.

Nutrient Delivery

Poor nutrient management and traditional methods of slurry spreading can cause a significant impact on the surrounding environment, predominantly through over-fertilisation, runoff/leaching polluting water ways, and the emission of greenhouse gases. For example, the use of a 'splash' plate has been shown to result in ≤100% loss of the total ammonia content, impacting the climate and human health by reduced air quality [10]. This also poses a significant loss of nutrients and yield for the farmer. However, when combined with lowimpact methods of slurry spreading (and the right time, place, and amount), the high organic matter content of the produced solids is thought to regenerate soil health and increase soil carbon, hopefully preventing soil erosion and mitigating climate change. We have demonstrated several sustainable ways for the application of the concentrated solid and liquid fertilisers produced by the dewatering plant.

In October 2021, Netafim led the installation of a drip irrigation system in a grazing field adjacent to the plant. This system will test the suitability of the liquid coming out of the DAF for fertigation by means of two different dripper technologies, both of which are pressure compensated to ensure no variation in flow. Once established and data has been collected throughout the growing season, we hope to demonstrate its cost-effectiveness through reduced spreading/contractor costs. Additionally, this may also lead to less gaseous emissions (specifically, ammonia and methane from nutrient volatilisation and carbon dioxide from spreading machinery), leading to better air quality on farm. A key principle of this technology relates to the efficient uptake of nutrients as the fertiliser is delivered directly to the plant root system, leading to less chance of run-off when compared to more traditional nutrient application. Now fully commissioned in preparation for this year's growing season, we have begun to see variation in grass growth suggesting its overall effectiveness (Figure 8). Previous surface trials conducted over the course of many months have proved successful with no major blockages reported.

Additionally, nutrient mapping and soil analysis, conducted by Map of Ag, has provided an overview of the soil nutrient stocks here at the farm. This will ensure the delivery of the right amount of fertiliser/slurry, particularly in areas of nutrient deficiency but also nutrient surplus (where additional savings may be made). Over the long term, this will also show how the applied dewatered solids effect carbon stocks within soil. In order to utilise this data, software linking our variable rate application muck/slurry spreaders has been installed on our tractors.

Figure 8. Visual differences in the growth pattern of the pasture. Caged areas enclose soil moisture sensors to ensure the ground never becomes over-saturated. Other equipment includes automatic pump/valves and back-flush lines to remedy any blockages.

Potential Applications

As the system we have develop is modular, this allows farmers and other intended users to ‘pick and choose’ what works best for them, for example, if there was a need to maximise your liquid storage capacity then mechanical separation alone can help achieve this, however, if you wanted to also capture the majority your nutrients (within the solid portion) then the incorporation of a chemical separation process is needed. Described below are some scenarios which may be applicable to a number of settings and budgets.

Scenario 1: Maximum nutrient capture
The equipment and infrastructure needed is comparable to what we currently have on trial (i.e., Screw press, Reaction Tank, Decanter Centrifuge, DAF, Reed Bed), alongside precision application/spreading equipment (e.g., muck/slurry spreaders and/or drip irrigation). This scenario may also help to meet consent limits for permissible discharge. However, it is worth noting that individual limits for Wales are yet to be agreed upon, and whether discharge consent would be feasible entirely. Other countries and/or areas under special designation (including Nitrate Vulnerable Zones) may also have regulations dictating this. Nevertheless, as we have demonstrated, the produced water is at a quality where it may be utilised back on farm, creating a circular hydrological-system and reducing costs associated with abstraction, eliminating the need for discharge and providing potable quality water for cows to drink.

Scenario 2: Fertigation / Irrigation
This design focus on the production of a liquid suitable for irrigation without causing blockages, whilst delivering nutrients (such as NPK) directly where they are needed. This set-up would be ideal suitable for those in the dairy industry with pasture, and perhaps other which also have elements of arable farming and horticulture. The equipment needed is comparable to what we currently have on trial (i.e., Screw press, Reaction Tank, Decanter Centrifuge, DAF, and a drip irrigator system (Netafim)) with the addition of a possible holding tank to dilute thicker slurries to ensure the produced liquid remains suitable for fertigation.

Scenario 3: Decanter only
An abridged design focusing on utilising the decanter and may be suitable for those producing larger amounts of slurry. The reliability of the decanter ensures a uniform product that is easy to spread (via a muck spreader) and store for later use, whilst maintaining a high treatment flow rate (when using larger models). Potential drawbacks of this design may include the loss of ammonia through the turbulence created within the centrifuge (as similar to most methods of slurry agitation).

Scenario 4: Screw press only
A simple design based solely on a mechanical screen separator. This set-up may be suitable for those with limited capital for initial investment; existing large slurry store capacity; and are not imposed/restricted by certain designations such as NVZ. The benefits of this scenario relate to its comparative cheapest to install; low maintenance; produces spreadable cake; and reduces volume of liquid needed for store. However, there will be a loss of nutrients within the liquid fraction, and the bulk volume needed for storage remains comparatively high.

Scenario 5: Recycled Drinking Water
While this solution is still in its research stage, the addition of a water purification system may result in portable drinking water suitable for livestock, whilst continuing to capture the

majority of nutrients within on-farm fertiliser. The equipment and infrastructure needed would be comparable to what we currently have on trial (Screw press, Reaction Tank, Decanter Centrifuge, DAF, Reed Bed) with the addition of a water purification technique and a separate, clean-water holding tank. This set-up would be suitable for those in areas without access to a reliable clean water supply, and/or those who are frequently exposed to drought (or are likely to be in the future due to climate change).

Scenario 6: Other animal slurries

In a similar fashion to dairy, both pig and poultry farms are ideal candidates for implementing dewatering and wastewater treatment. Despite the inherent differences in slurry characteristics (i.e., pig is typically more liquid than dairy slurry, whereas the opposite is true for poultry), alterations to the parameters within the modular systems of the scenarios previously described would allow for their treatment.

Scenario 7: Biogas digestate

The recent adoption of biogas plants, particular across the Europe and the Americas, typically utilises agricultural wastes such as livestock manure to create scalable, renewable energy source on-farm. Many governments have expressed interest in further investment into biogas technology and, with the potential to replace a fifth of current natural gas consumption, the market has regularly been described as “untapped”[11]. However, one key issue arises from the production of nutrient-dense by-products (digestate and liquor), is how do we safely treat these? The application of the scenario 1 could also be feasible within this setting.

Conclusion & Upcoming Developments

Dairy slurry and subsequent wastewaters are complex colloidal systems made up of water, organic matter, nutrients, undigested feed, bedding and other suspended particles, continually variable by season, weather, and farm management practices. So far, the dewatering system illustrated above has proven successful in the treatment of dairy slurry, and during its reception to industry and visiting public, most, if not all, have been quietly impressed. Costs incurred through the implementation and maintenance of the described technologies may on the surface seem expensive. However, the tightening of legislation (such as NVZ in Wales through The Water Resources (Control of Agricultural Pollution) Regulations
2021) and present economic factors (such as inflated fertiliser costs) may make it a worthwhile solution for some dairy farmers already, and foreseeably more in the near future.

It goes without saying, continued pressure created by the pandemic and Brexit has led to several project setbacks. Despite this, the plant has remained functional in some shape or form, and we continue to undertake a tight-schedule of testing as planned throughout second half of 2022. One continual challenge relates to the ability for demonstrating a working model which matches the flow rate with the volume of slurry produced by large-scale dairy farms whilst (at the same time) producing a liquid suitable for fertigation. As the system is modular and each of the components are scalable, we principally believe that a larger reaction tank and decanter centrifuge with the appropriate capacity to match the volumes of slurry produced would help counteract this. Another challenge is to ensure an appropriate level of treatment while keeping operational costs down to a level which ensures affordability. Once we have collected and analysed our final trial data, we'll calculate estimated capital expenditure and operational costings (on a per 100 cow and slurry cubic metric basis) in our final report out in December 2022.

Upcoming Developments

In partnership with N2-Applied, we are expected the installation of a nitrogen fixing unit to be completed late summer. The N2 Unit upgrades slurry to an efficient and sustainable fertiliser by using electricity and air to increase the nutrient content, whilst also eliminating emissions through the process of acidification. The end product is called NEO (Nitrogen Enriched Organic fertiliser). We hope to soon have data covering a full growing season from our trials amended with NEO – to demonstrate any difference between traditional slurry spreading and the enriched NEO.

Being an EU funded project, our timeline to complete our aims and objectives concludes this coming December when we shall prepare our final report and make our final conclusions on the applied technologies, with hopes to provide the industry with the guidance and support it needs with regards to slurry storage and on-farm nutrient management.

Acknowledgments

The team would like to thank the project partners and funders for their continued support and expertise.

If you would like to find out more, or wish to get involved with the project, please feel free to contact us via https://arc-csg.cymru/ or call 01554 748 570. Additionally, we have arranged an Open Day for the 15th of September to which all are welcome.

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PARTNERIAETH MAETHOLION FFERM TYWI

Mae'r prosiect yma wedi ei sefydlu ar lwyddiant datblygu proses dad-ddyfrio Prosiectslyri. Mae'r canlyniadau rhagorol o wahanu maetholion a dŵr yn dangos potential i wella effeithiolrwydd defnydd gwrtaith a lleihau allyriadau.

Mae'r prosiect diweddaraf wedi derbyn arian cyfalaf o Lywodraeth Cymru ac arian Ewropeaidd I addasu'r cyfarpar ac arian cyfatebol i weithio hefo partneriaid masnachol. Rydym wedi cytuno ar raglen waith sydd nid yn unig â'r nod o sicrhau manteision masnachol i bartneriaid, ond sydd hefyd yn darparu ateb ymarferol ar gyfer amaethyddiaeth sy'n helpu ffermwyr i fodloni rheoliadau NVZ.

TYWI FARM NUTRIENT PARTNERSHIP

This project is based on the successful outcome of the original treatment project, Prosiectslyri. The very impressive nutrient separation achieved has shown that de-watering has the potential to maximise nutrient recycling on-farm, whilst reducing emissions and water pollution.

Adaptions to infrastructure identified has attracted grant funding from Welsh Government as well as EU smart expertise, matching pound for pound money generated from industry partners. We have agreed a program of work that not only aims to return commercial benefits for partners, but also provides a practical solution for agriculture which helps farmers to meet NVZ regulations.