Moo Maths!
FIRST LEVEL

Intro

Welcome to the RHET Moo Maths pack. This pack demonstrates how to integrate real-world data from a dairy farm into Numeracy and Mathematics learning and teaching. The total number of dairy cows has increased by 6% over the past 10 years. In 2023, there were just under 794 dairy herds in Scotland; the number of dairy cows in the country was 180,648, with an average herd size of 227 cows. In fact, 52% of beef now comes from the dairy industry and registrations of dairy-beef calves have risen by 77% over the past 10 years due to the rising use of beef semen by dairy producers.

Milk is produced on farms across Scotland, but the majority of dairy herds are in the south-west of the country where the warm wet climate yields the lush green grass on which dairy cattle do so well.

A dairy cow must have a calf annually in order to produce milk, in recent years genetics have become important enabling farmers to guarantee female replacements from the best milkers and high quality beef calves from the remaining animals.

The most popular breed of dairy cow is Holstein-Friesian but more and more herds are turning to other breeds to help improve the butterfat and protein content of the milk. Other breeds in Scotland are the Friesian, Swiss Brown, Ayrshire, Shorthorn, Jersey, Guernsey and the Fleckvieh.

The learning in this pack uses the dairy farm context and aims to make Numeracy and Mathematics engaging, relevant and practical for learners.

What this pack contains

- All the resources to undertake some First Level 'Moo Maths'.
- This pack contains information from case studies with classes already embedding 'Moo Maths' within Numeracy and Mathematics as well as planning tools to allow practitioners to identify opportunities for learning and teaching.
- Lesson plans that provide some examples to support planning, teaching and learning at First Level Curriculum for Excellence.
- Suggested Experiences & Outcomes
- Learning for Sustainability links.
- DYW opportunities.
- Suggested additional activities.

Contents

Objectives

Enhance Engagement: Utilise real-world scenarios and data, to make Numeracy and Mathematics interesting, relatable and practical.

Practical Application: Show and demonstrate to learners how maths is used in everyday life and the world of work.

Data Literacy: Introduce basic data collection, analysis and interpretation skills.

Interdisciplinary Learning: make connections between mathematics and other curricular areas within Curriculum for Excellence.

Learning for Sustainability

Goal 4 Quality education: 4.7 ensure that all learners acquire the knowledge and skills needed to promote sustainable development.

Goal 9 Industry, innovation and infrastructure: 9.5 encouraging innovation and substantially increasing the number of research and development workers.

Goal 12 Responsible consumption and production: 12.8 Promote public procurement practices that are sustainable; achieve the sustainable management and efficient use of natural resources.

Developing the Young Workforce

Entitlement opportunities to engage in profiling that supports learning and the development of skills for work and future career choices.

Linking your class to a dairy cow

Data is collected daily from each dairy cow, the farmer looks at the number of steps, body temperature, volume of milk produced, amount of food eaten and water drunk to ensure the herd is healthy, productive and efficient.

RHET has used this data to create an exciting NEW math program - Moo Maths. The learning context explores a range of Numeracy and Mathematic Experiences and Outcomes within Curriculum for Excellence.

RHET have a network of farms across Scotland and we can link your class to a local dairy farmer who will provide data from an individual cow, which your class could follow and learn with. Where this is not possible, we will provide online introductions to dairy cows and will share data on these cows with you throughout the year.

To register an interest in visiting a dairy farm and adopting a school cow please complete our farm visit form (ensuring you add *'I am interested in adopting a school dairy cow'* to your request.) https://www.rhet.org.uk/teachers/visit-a-farm/request-a-farm-visit/

Plean Farm example

Using data from farmer Lynne Reid (Plean Farm, Stirling), you can find some examples of learning experiences developed by Class Teacher and Numeracy Lead, Donna Bullivant, with her Primary 3 and Primary 5 classes (Numeracy and Mathematics First and Second Level with opportunities to explore Third Level). The planned activities could be incorporated into Early, First, Second and Third Level to support learning and teaching of Numeracy and Mathematics as well as other inter-disciplinary areas.

During farm visits, learners can find out about ways the data surrounding cow activity is collected from each cow. The **pedometer** shown here contains data which can be shared with practitioners to use as part of problem solving scenarios.

Pedometer from dairy cow

Farm visits are invaluable in providing learners with real life insight into the life of a working farm.

Guided tours through the milking parlour bring to life where milk starts its journey.

Data collected from dairy cows can then be analysed at the appropriate level and challenge for learners.

Plean Farm milking parlour

Within the examples shared here, problems and questions were designed to come from either 'the adopted cow' or from 'the farmer' to encourage learners to support the cow and farmer with real life problem solving scenarios.

Curriculum for Excellence Experiences and Outcomes	Suggested activities
Moo Maths learning context will provide learners with opportunities to explore the following theme from First Level Numeracy and Mathematics: **Mathematics - its impact on the world, past, present and future** I have discussed the important part that numbers play in the world and explored a variety of systems that have been used by civilisations throughout history to record numbers. **MTH 1-12a**	
Number and Number Processes:	
I can use a calendar to plan and be organised for key events for myself and my class throughout the year. **MNU 1-10b**	**Calendar problems using adopted cow information regarding date of birth:** "I was born in September, can you tell me which **season** I was born in?" "My birthday is 3rd September, can you tell me how many days are in the **month** I was born?" "I am 3 years and 2 months old. **How many** months have I been alive for?"
I have investigated how whole numbers are constructed, can understand the importance of zero within the system and can use my knowledge to explain the link between a digit, its place and its value. **MNU 1-02a** I can use addition, subtraction, multiplication and division when solving problems, making best use of the mental strategies and written skills I have developed. **MNU 1-03a**	**Cow pedometer data problems:** Learners can investigate how whole numbers are constructed by solving problems linked to the number of 'steps' the cow has taken during specific periods of time e.g. half an hour, hour, daily, weekly. Build on number processes by extending the number value as appropriate. Data can be adjusted and broken down to relevant level for learners (from Early through to Third Level and beyond). For example, build up from ones, tens, hundreds, thousands to more complex numbers as appropriate. "One day I walked 56 steps in half an hour. Can you use **concrete materials** to make this number for me?" "At the start of this month, I walked an **average** of 948 steps in one day. Can you use **concrete materials** to make this number for me?" "At the end of this month, I walked an **average** of 1128 steps per day. Can you use **concrete materials** to make this number for me?" Learners can work out the difference between a range of numbers (daily steps) using addition, subtraction, multiplication and division strategies, adapting whole numbers as appropriate for level of challenge. For example… **Multiplication:** "Farmer Lynne keeps talking about the number of steps I do then she multiplies it by different numbers. I'm a little confused! Could you please help me to work out different ways to solve multiplication problems?"

Measurement:

I can estimate how long or heavy an object is, or what amount it holds, using everyday things as a guide, then measure or weigh it using appropriate instruments and units.
MNU 1-11a

I can estimate the area of a shape by counting squares or other methods.
MNU 1-11b

Volume:
"This month I produced an average of 40 litres per day. Can you help me understand what volume this is by estimating then measuring ½ litre and 1 litre?"

"Can you show me what 40 litres looks like? This will help me understand how much milk I produce!"

Opportunities here for outdoor learning. Make an 'outdoor udder' using containers of varying size, then estimate and measure the specific volume. **See photo** as an example.

Weight:
Farms and/or RHET coordinators may be able to supply you with samples of animal feed to make the learning real.

An example of a question from 'Buttercup' focusing on weight...

"I eat 60kg of food per day, can you tell me how many grams are in a kilogram? Let me see how heavy 1 kg is by weighing out 1000 g of..."

Length and Area:
Further opportunities here for outdoor learning. Using loose parts materials, learners can design 'pens' for calves then measure the length of the sides of the pens. Play based learning in class using small world farm areas could also be used for smaller scale 'pens', allowing learners to make pens using concrete materials such as counting sticks and cm cubes.

Learners working within First Level can create pens of different shapes using concrete materials as well as squared paper.

Money:

I can use money to pay for items and can work out how much change I should receive. **MNU 1-09a**

I have investigated how different combinations of coins and notes can be used to pay for goods or be given in change. **MNU 1-09b**

Learners can use data from the farmer to explore Money Experiences and Outcomes.

Farmers can provide information about the amount of money they receive from the dairy for each litre of milk produced. This allows learners to investigate different combinations of coins and notes to make a given amount.

Other options include the amount of money for each bag of animal food. Teachers can differentiate the activities by amount appropriate for each group/learner e.g. smaller amount of money could be the amount per day to feed one of the cows during winter.

Learners can again make this amount using different combinations of coins.
A farm shop could be set up to allow classes to use money in a practical setting e.g. work out the amount of change required from a given amount to buy a litre of milk.

Time:

I can tell the time using 12 hour clocks, realising there is a link with 24-hour notation, explain how it impacts on my daily routine and ensure that I am organised and ready for events throughout my day.
MNU 1-10a

I can use a calendar to plan and be organised for key events for myself and my class throughout the year.
MNU 1-10b

I have begun to develop a sense of how long tasks take by measuring the time taken to complete a range of activities using a variety of timers.
MNU 1-10c

Routines
During the site visit, farmers will share information about the times the cows are milked each day.

Learners can then explore these outcomes back in class by linking learning from the farm and make a visual routine for the adopted dairy cow, incorporating different times of the cow's day e.g. milked at 6am (show on clocks), in field at ___, milked again at 4pm.

Date of birth
When learners meet the adopted cow, they will find out information about where and when the cow was born. As mentioned above, this can lead to explore calendars and seasons by incorporating information about how old the cow is in years and months, which season the cow was born in.

How long does milking take?
Learners will find out information about how long the cow spends in the milking parlour, a variety of timers can be used to represent this time.

Fractions, Decimal Fractions and Percentages:

Having explored fractions by taking part in practical activities, I can show my understanding of:
- how a single item can be shared equally
- the notation and vocabulary associated with fractions
- where simple fractions lie on the number line.

MNU 1-07a

Through exploring how groups of items can be shared equally, I can find a fraction of an amount by applying my knowledge of division.
MNU 1-07b

Through taking part in practical activities including use of pictorial representations, I can demonstrate my understanding of simple fractions which are equivalent.
MTH 1-07c

Fractions, Decimals and Percentages:
During onsite and virtual farm visits, farmers can share information about the composition of animal feed. Using this information, plan for activities to investigate the amount of each ingredient as a fraction. See photos below.

Link with measurement activities. For example, ½ metre is 500 cm.

Data Analysis:

I have explored a variety of ways in which data is presented and can ask and answer questions about the information it contains.
MNU 1-20a

I have used a range of ways to collect information and can sort it in a logical, organised and imaginative way using my own and others' criteria.
MNU 1-20b

Using technology and other methods, I can display data simply, clearly and accurately by creating tables, charts and diagrams, using simple labelling and scale.
MTH 1-21a

Data Handling
Opportunities to explore the way data can be represented. Learners can compare the graphical data from farmers with a myriad of ways of displaying data within Numeracy and Mathematics problem solving.

"Can you help sort my information for each month to help me see how much milk I produced?"

Learners could analyse the amount of milk, food, steps etc. according to the level of challenge within each class. Opportunities here to explore using concrete material or technologies to display information based on the data from the farmer.

See photos below for examples of graphs created by Primary 3 learners. Learners created the graphs shown in the pictures by independently selecting concrete materials.

Learning in action library

Opportunities to embrace Concrete, Pictorial and Abstract pedagogy within Moo Maths:

Number Processes

Photo 1: Partitioning with Numicon to represent 56 'steps'

Photo 2: Ten frames and counters (56) to represent 56 'steps'
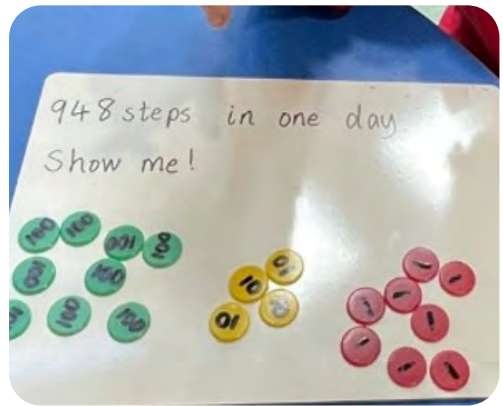

Photo 3: Dienes materials to make 948 'steps'

Photo 4: Place value counters to make 948 'steps'

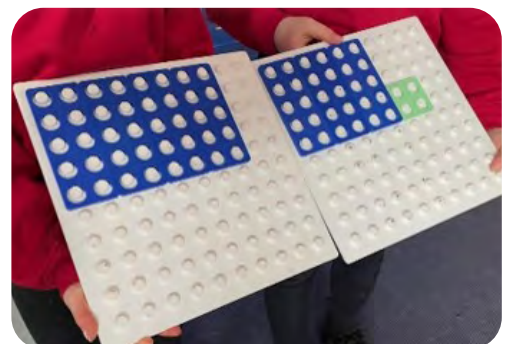Photo 5 and Photo 6: Concrete materials to partition 1128 'steps'

Photo 7: Numicon to make 40 'steps' and 34 'steps' to work out the difference

Photo 8 and Photo 9: Balance scales used with Numicon to work out the difference between step amounts

Money

Photo 10: Money (price of a litre of milk received by farmer)

Photo 11: Money (price of a litre of milk customers pay in a supermarket)
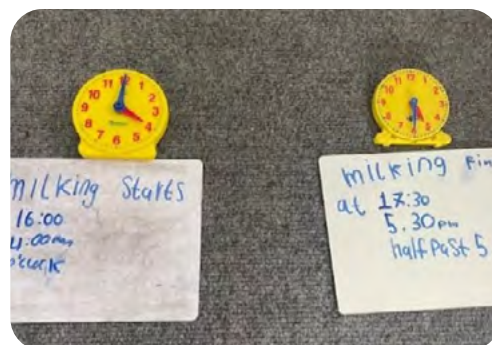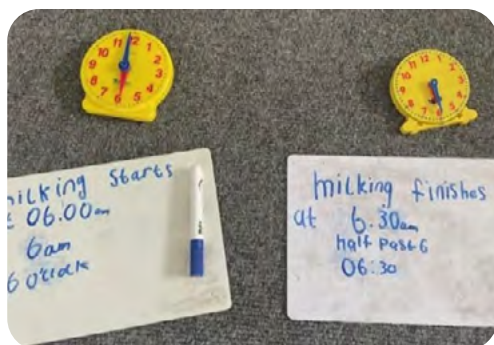
Time

Photo 12 and 13: Time (learners set times for morning milking and afternoon milking. Differentiated within level e.g. 24 hour time, o'clock/half past, am/pm)

Photo 14: Estimating and measuring volume of 'milk'

Photo 15: Estimating and measuring volume of 'milk'

Photo 16: Weight of food, learners making 1 kg in different ways.

Opportunities to embrace outdoor learning and play based problem solving within Moo Maths:

Photo 17: 'Outdoor udder' learners collectively created an udder to hold 40 litres of milk to show volume of milk produced by 'Buttercup' in one day

Measurement and Number Processes

Opportunities to embrace outdoor learning and play based problem solving within Moo Maths:

Provide learners with opportunities to solve problems based on the size of pens for new-born calves. Using information from government guidelines, learners can build pens of specific sizes to represent the perimeter and area (differentiate accordingly).
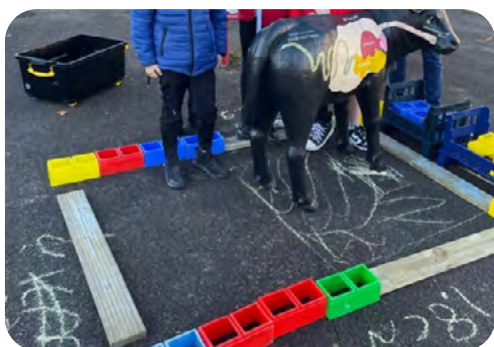Explore decimal notation at Second Level.

Photo 18: Loose parts problem solving linked to measurement

Photo 19: Loose parts problem solving linked to measurement

Data Handling

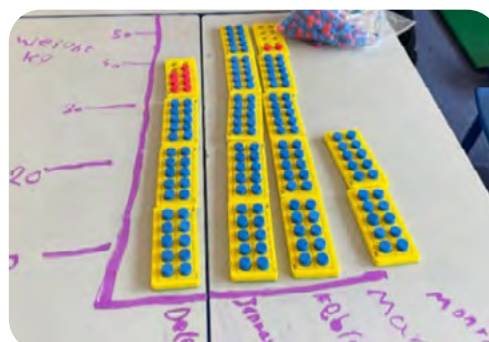Photo 20 and Photo 21: Weight of food eaten by cow from December to March

Photo 22 and Photo 23: Weight of food eaten by cow from December to March

Measurement: Weight

Photo 24: Onsite visit to Plean Farm, weighing quantities of each ingredient in animal feed
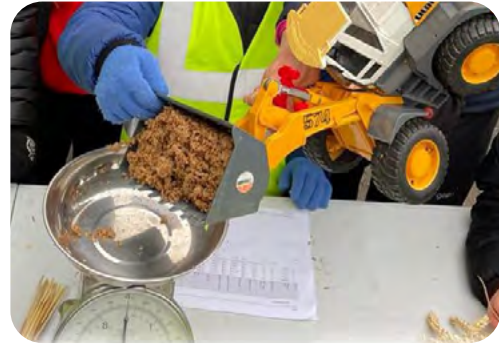

Photo 25: Onsite visit to Plean Farm, weighing quantities of each ingredient in animal feed

Photo 26 and Photo 27: RHET visit to school, learners measured the perimeter and area of animal transportation to ensure it was within minimum guidelines for animal transportation

Measurement and Data Handling: Volume

Tinkering Teams

Buttercup's milk production!

Months:	
December	34 litres
January	40 litres
February	37 litres
March	32 litres

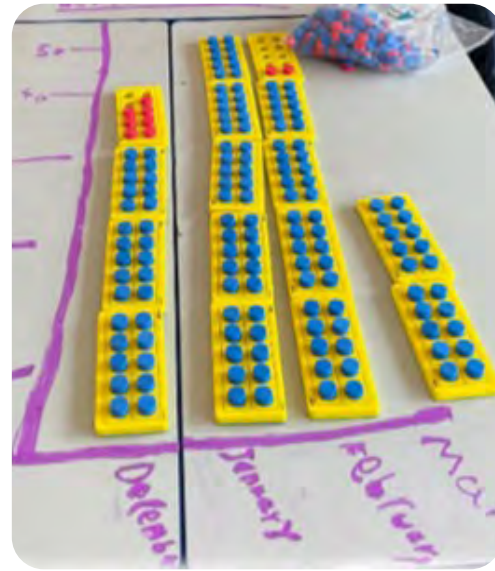Photo 28: Average volume of milk produced by 'Buttercup' over period of 4 month

Photo 29 and Photo 30: Concrete materials used to display information about volume of milk produced over a 4 month period.

Opportunities to embrace Play Based pedagogy within Moo Maths:

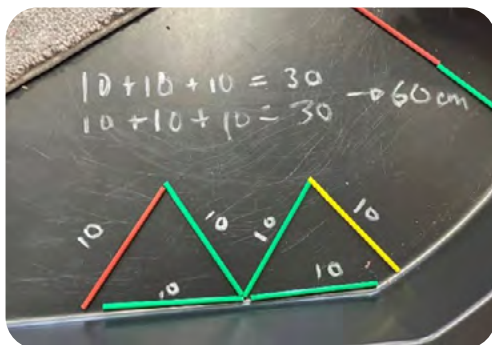Tuff tray ideas linked to measurement and 'pens'.

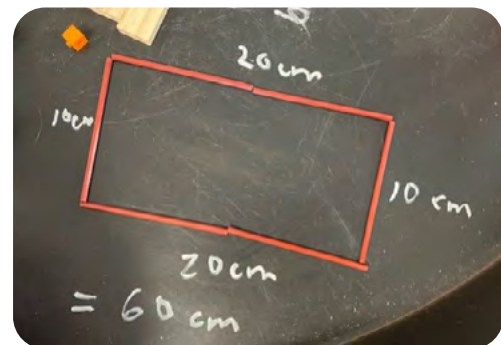Photo 31: Learners tinkered with different shapes to make perimeter of 60cm

Photo 32: Learners tinkered with different shapes to make perimeter of 60cm
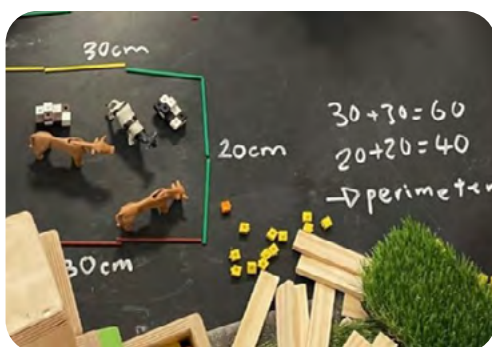

Photo 33: Learners tinkered with different shapes to make perimeter of 60cm

Photo 34: Learners tinkered with different shapes and measurements to build a farm using concrete materials (Learning Intention and Success Criteria shared with learners at start of the task)

Photo 35: Learners tinkered with different shapes to make perimeters up to 100cm

Photo 36: Concrete materials used for problem solving linked to perimeter of 25cm (discussion about odd and even numbers). Challenge learner to generate why or why not perimeter can be made with 25cm.
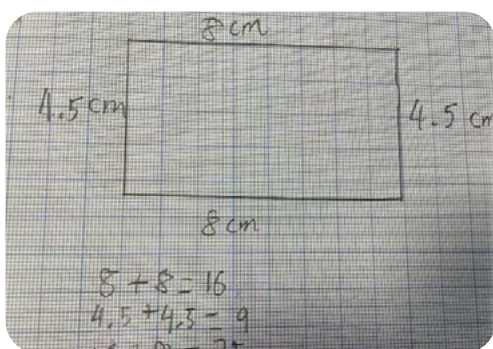
Photo 37: Pictorial representation to show how to make a perimeter of 25 cm. Learners identified that a perimeter of 25 could be achieved with a half cm square. Link this with decimal fractions.

Photo 38: Fractions, Decimals and Percentages problem solving using animal feed composition, tuff tray challenge

Photo 39 and Photo 40: Percentages problem solving using concrete materials to solve animal feed composition problems (coloured pegs representing percentage of an ingredient)
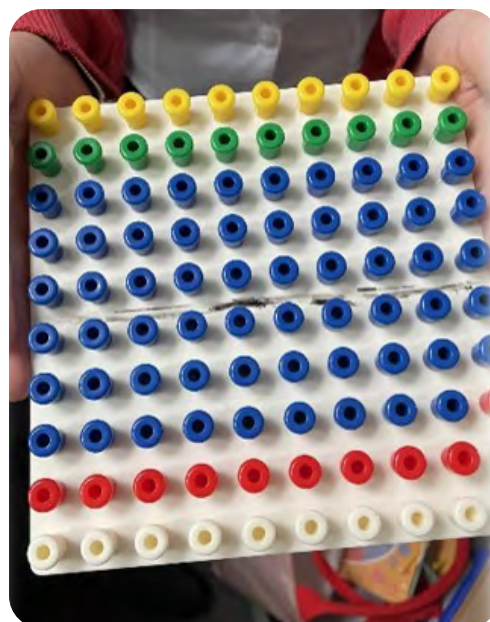
Let's Get Mooving Lesson plan

RHET

Learning Intention:	These activities aim to introduce learners to the number of 'steps' taken by their adopted cow in a set period of time. Learners will investigate number structure by using concrete materials to represent the number of 'steps' taken by the cow over set periods of time.
Number and Number Processes:	I have investigated how whole numbers are constructed, can understand the importance of zero within the system and can use my knowledge to explain the link between a digit, its place and its value. **MNU 1-02a**
Resources:	• Pedometer data from farmer about cow's 'step count' for a set period of time (differentiate accordingly depending on Level). • Selection of concrete materials.
Learning outline:	• Link back to prior learning from either the visit to the farm or the virtual farm visit. Ask learners what they can remember about pedometers and step counts for each cow and why this data is important for the farmer. • Depending on Numeracy and Mathematics Level learners are working within, discuss how many steps their adopted cow has taken in a set period of time. For example, start with the number in half an hour, an hour, half a day, full day, a week or month. • Assess learners' knowledge of number structure by asking learners to use concrete materials to represent the number of 'steps'. Examples can be found in the provided images.
Follow up activities	• Try some sheep maths. • You can find out about some to the STEM used on beef and potato farms, discover more about farm food chains and explore wildlife on the farm with our interactive Thinglink.

Examples of learning from Primary 3 Pilot Project:

Learners used Numicon to represent 56 steps taken by their cow in a half hour period.
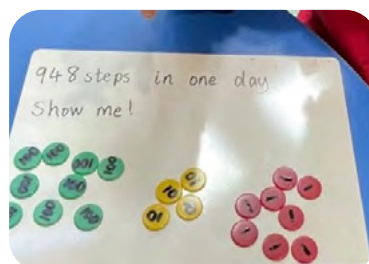
Learners used place value counters to represent 948 steps in one day.
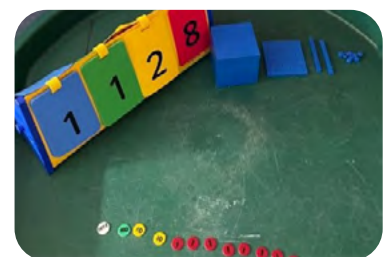
Learners used a range of concrete materials to represent 1128 steps in one day.

Let's Get Mooving

Learning Intention:

- I am learning to investigate how whole numbers are constructed.
- I am learning to use concrete materials to explore how numbers are constructed.

The farmer uses a **pedometer** to record the number of steps your cow takes each day.
In **half an hour**, your adopted cow took _____ steps.
Use concrete materials to show 4 ways to make this number.

Concrete

Use the space below to draw 4 ways to represent the number of steps your cow takes in one day.

Pictorial

Use the space below to write 4 ways to make the number of steps your cow takes in _____.

Abstract

Money and Milk lesson plan

Learning Intention:	These activities aim to introduce learners to the money farmers receive for each litre of milk compared to the amount a consumer pays in a shop for the same volume.
Money:	• I can use money to pay for items and can work out how much change I should receive. **MNU 1-09a** • I have investigated how different combinations of coins and notes can be used to pay for goods or be given in change. **MNU 1-09b**
Resources:	• Information from farmer about how much they get paid per litre of milk produced by the adopted cow. This amount can fluctuate month by month (differentiate accordingly depending on Level). • Range of prices from shops for a litre of milk. • Selection of concrete materials. • Notes and coins.
Lesson outline:	• Link back to prior learning about the amount they may have paid for milk in shops. • Learners can research and compare the cost for a litre of milk in different shops. This can link with cost of living and the need to price items in different shops. If possible, learners could visit a local shop to buy milk to maximise opportunities for learners to explore mathematics in real life scenarios. • Share information from the farmer about the price per litre of milk they were paid in the previous month. Compare this to the price paid in a shop. • Depending on Numeracy and Mathematics Level learners are working within, investigate the difference between the amounts. • Assess learners' knowledge of money by asking learners to use concrete materials/ coins to represent the difference between the amounts the farmer receives and the amount consumers pay.
Follow up activities	• Our farm shop worksheet looks at the cost of items in a farm shop.

LEARNER WORKSHEET
Money and Milk

Learning Intention:
- I am learning to compare costs from different retailers.
- I am learning to use the terms profit and loss in buying and selling products.

This month the farmer got paid _____ per litre of milk produced by your cow. Use concrete materials to make this amount.

Find out how much a litre of milk costs from **4 different shops**. Calculate the difference between the amount the farmer gets paid and the amount the shops receive. How much profit is this overall?

Name of shop	Price per litre of milk	Difference between price the farmer receives and price consumers pay

Draw the combination of coins you could use to make _____ in 4 different ways:

Challenge

Compare the prices of **4** Scottish dairy products between 4 different shops. Work out where would be the most cost effective place to shop to buy products with a budget of **£10**.

Item:	Shop name:	Price:
Total cost of 4 dairy products:		

Time for Milk lesson plan

Learning Intention:	This activity aims to introduce learners to the concept of 'time' on the farm by learning about the times farmers milk the dairy cows each day.
Time:	• I can tell the time using 12 hour clocks, realising there is a link with 24-hour notation, explain how it impacts on my daily routine and ensure that I am organised and ready for events throughout my day. **MNU 1-10a** • I can use a calendar to plan and be organised for key events for myself and my class throughout the year. **MNU 1-10b** • I have begun to develop a sense of how long tasks take by measuring the time taken to complete a range of activities using a variety of timers. **MNU 1-10c**
Resources:	• Information from farmer about time milking starts and ends in the morning and afternoon. The time the milk tanker collects the milk from the farm and when it arrives at the dairy. How long is it between the milk leaving the farm and arriving in the shops? • Range of timing devices.
Lesson outline:	• Begin with assessing learners' ability to tell the time in a range of ways. At all Levels, learners will be able to use this context to explore telling the time in a range of ways. Link back to prior learning from previous lesson before exploring new experiences and outcomes. • Use information from the farmer about times of milking beginning and ending to calculate durations. Tasks can be adapted according to Level e.g. learners can record the times in a range of ways e.g. 12-hour analogue, 12-hour digital, 24-hour clock, minutes, hours. • Assess learners' knowledge of time by providing a range of start and end times as required to check application of learning.
Follow up activities	• Can you use a timer to time how long it takes to make butter? You can try making it with cold cream and cream at room temperature. What do you discover?

LEARNER WORKSHEET
# Time for Milk

Learning Intention:
- I am learning to tell the time using 12 hour clocks.
- I am learning to measure the time taken to complete a range of activities.

Milking time on the farm starts at _____ in the morning. It finishes at _____ in the morning. Show these times on the clocks below:

Work out the duration of morning milking in hours and minutes:

Afternoon milking on the farm starts at _____ in the afternoon. It finishes at _____ in the afternoon. Show these times on the clocks below:
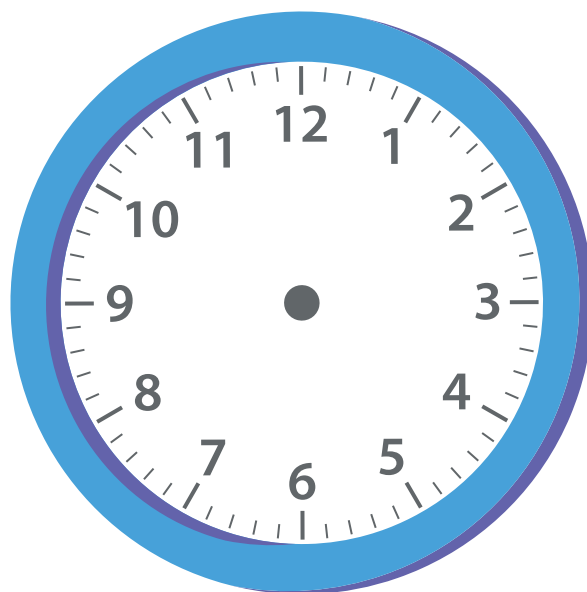
Work out the duration of afternoon milking in hours and minutes:

'Mooving' to a New Home Lesson Plan

Learning Intention:	These activities aim to introduce learners to the concept of measurement on the farm by learning about the size of 'calf pens' in line with government guidelines. This can be a play based problem solving task as well as an indoor small world task (see photos for ideas).

Measurement (Length and Area):	I can estimate the area of a shape by counting squares or other methods. **MNU 1-11b**

Resources:	• Information from farmer about recent government guidelines for 'pen' sizes for different ages of calves. • Loose materials for outdoor learning challenges. • Loose materials for small world indoor challenges. • Range of measuring tools e.g. rulers, metre sticks, trundle wheels.

Lesson outline:	• Begin by assessing learners' prior learning by investigating ability to measure using a selection of measuring tools. • Use information from the farmer about 'pen' sizes to ask learners to design, build and measure 'pens' of specific sizes. • Differentiate tasks according to Level – see Curriculum for Excellence Experiences and Outcomes above. For example, at First Level learners will focus on estimating and measuring in metres and centimetres. • Provide learners with a 'problem' e.g. The farmer requires a 'pen' for a new calf on the farm which must be at least 1.5m long x 0.75m wide for a calf up to 4 weeks or 1.8m long x 1.0m wide for a calf up to 8 weeks. • Provide learners with a range of loose materials (indoors or outdoors) to design and measure to check if they have accurately created a suitably sized 'pen' for a calf.

Follow up activities	• What shapes can you see in a tractor? (e.g. circle, triangle, square) Why are wheels round? Why are windows all similar shapes? Draw the shapes that you identified onto pieces of squared paper. • Can you estimate the area of all the different shapes? What objects or pictures can you make using the assorted shapes (tangrams)? • Can you use some of the same shapes to make a triangle, square or circle (tessellation)?

'Mooving' to a new home

Learning Intention:

- I am learning to use common units of measure.
- I am learning to convert between units of measure when solving problems.
- I am learning to find the perimeter of a shape.

Newly born calves on the farm require a new home. Regulations state that the size of the pen for calves up to 4 weeks old is a minimum of 1.5m long x 0.75m wide and the size of pen for an 8 week old calf is 1.8m long x 1m wide.
Use loose materials to make and estimate the size of a pen for either a 4 week old or 8 week old calf.

0.75 metres

1.5 metres

Perimeter = distance all the way round the outside of the shape.

Measure the perimeter of the pen and record below:
Perimeter in metres:

Convert between metres and centimetres then record your answer below:
Perimeter in centimetres:

1.0 metres

1.8 metres

Perimeter = distance all the way round the outside of the shape.

Measure the perimeter of the pen and record below:
Perimeter in metres:

Convert between metres and centimetres then record your answer below:
Perimeter in centimetres:

Data Handling Lesson Plan

Learning Intention:
These activities aim to introduce learners to the concept of data handling on the farm by learning about the average volume of milk produced, grass eaten, standing/lying time, motion index and 'steps' taken by their adopted cow.

Data Analysis:
- I have explored a variety of ways in which data is presented and can ask and answer questions about the information it contains. **MNU 1-20a**
- I have used a range of ways to collect information and can sort it in a logical, organised and imaginative way using my own and others' criteria. **MNU 1-20b**
- Using technology and other methods, I can display data simply, clearly and accurately by creating tables, charts and diagrams, using simple labelling and scale. **MTH 1-21a**

Resources:
- Data from farmer about volume of milk produced, weight of grass/silage eaten, standing/lying time, motion index and 'steps' taken by their adopted cow.
- Concrete materials for creating graphs
- Access to technologies to analyse, create and interpret data (depending on Level)

Lesson outline:
- Depending on Level of learners, begin by assessing learners' ability to analyse data at relevant level.
- Use information from the farmer to devise questions for learners to answer, e.g.
    On what day did your adopted cow produce the most milk this week?
    What weight of animal feed was consumed on Tuesday?
    Do you recognise trends in data over a period of time?
    What happens to animal feed consumption in the winter months compared to the summer months?
- Provide learners with a summary of key data then ask learners to construct their own graph to represent data over a period of time. Differentiate tasks according to Level – see Curriculum for Excellence Experiences and Outcomes above.

For example, at First Level learners will focus on sorting information into graphs, tables and charts.

Follow up activities
- You can investigate the volumes and measurements involved in making butter with our Maths and butter worksheet.

Examples of learning from Primary 3 Pilot Project:
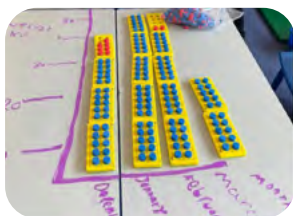
Animal Feed:
Learners working within First Level were provided with data about the average consumption of animal feed by their adopted cow in kg between December and March. Learners then used concrete materials (Ten Frames) to represent this data in graphical form.
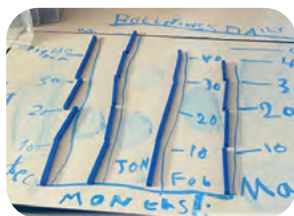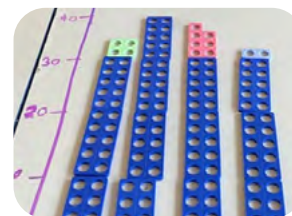
Animal Feed:
Learners working within First Level were provided with data about the average consumption of animal feed by their adopted cow in kg between December and March. Learners then used concrete materials (Dienes materials) to represent this data in graphical form.
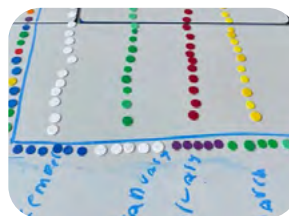
Milk Production:
Learners working within First Level were provided with data about the average milk production in litres by their adopted cow between December and March. Learners then used concrete materials (counters) to represent this data in graphical form.

Milk Production:
Learners working within First Level were provided with data about the average milk production in litres by their adopted cow between December and March. Learners then used concrete materials (Numicon) to represent this data in graphical form.

Data Handling

Learning Intention:

- I am learning to collect and sort information in an organised way.
- I am learning to display data accurately by creating tables and charts.
- I am learning to use labelling and scale.

Find out information from the farmer about the average weight of animal feed your cow eats each month. **Complete the table below:**

Month	Average weight of animal feed (kg)
December	
January	
February	
March	

Using concrete materials, create a chart to display the data about animal feed consumption. Remember to include a **title** and **labels**.

Challenge

Use squared paper to draw the graph accurately.
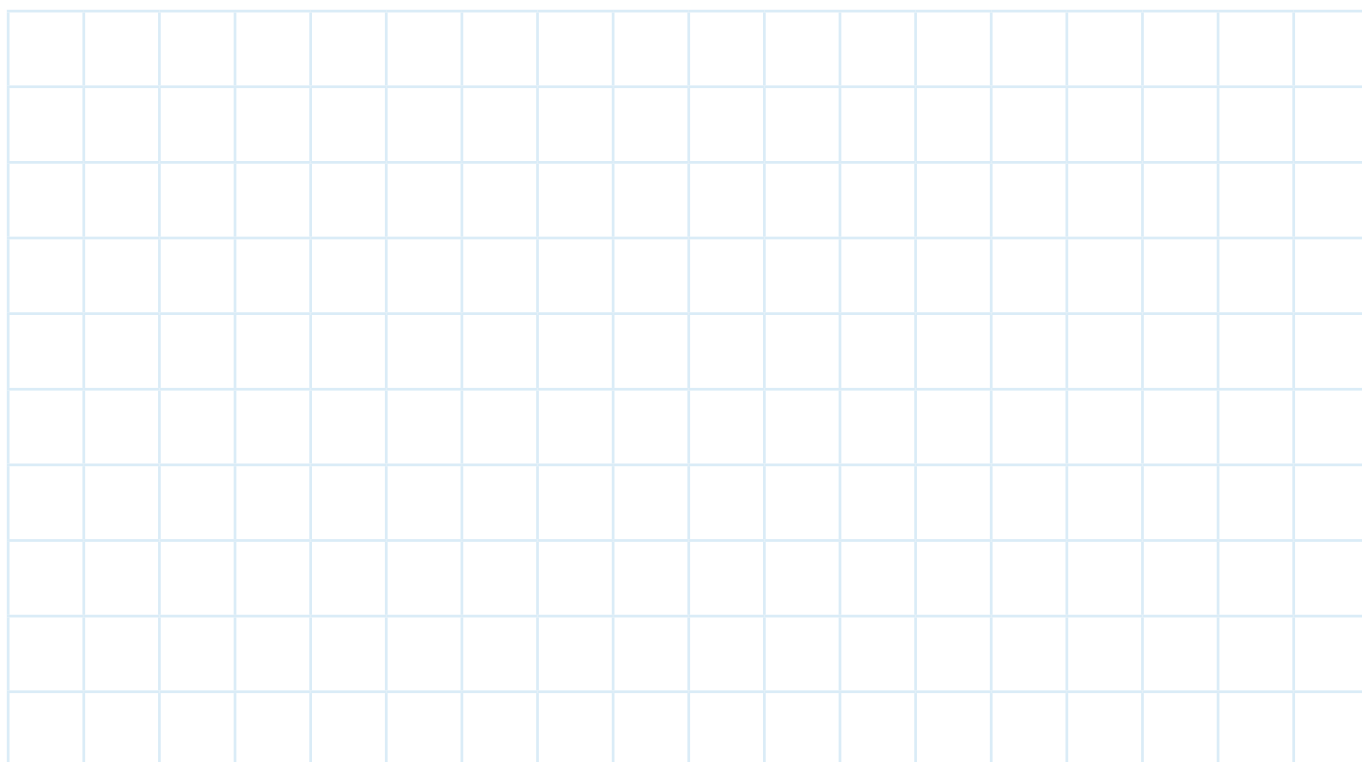
Find out information from the farmer about the average daily milk production for your cow each month in litres.

Complete the table below:

Month	Average daily milk production (litres)
December	
January	
February	
March	

Using concrete materials, create a chart to display the data about daily milk production. Remember to include a **title** and **labels**.

Challenge

Use squared paper to draw the graph accurately.
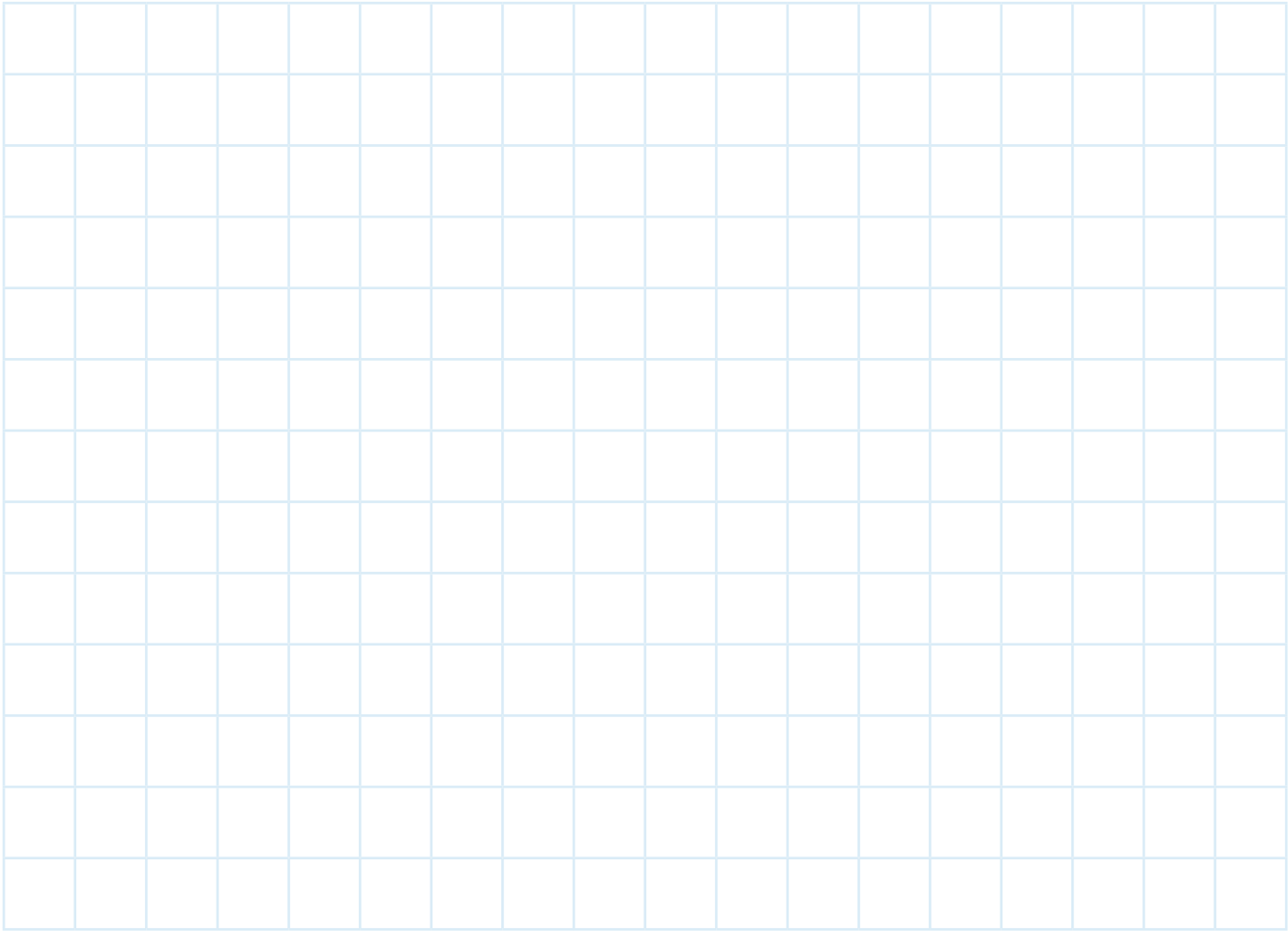
Feeding Time Lesson plan

Learning Intention:	These activities aim to introduce learners to the concept of measurement (weight) on the farm by learning about the weight of grass and other nutritional feed, which their adopted cow eats. Learners will learn about the way dietitians provide farmers with nutritional information to optimise the health of cows and milk production. This is an opportunity to make links with fractions, decimals and percentages (see further examples below).
Measurement (Weight):	I can estimate how long or heavy an object is, or what amount it holds, using everyday things as a guide, then measure or weigh it using appropriate instruments and units. **MNU 1-11a**
Resources:	• Data from farmer about weight of grass/silage and animal feed eaten by their adopted cow. • Samples from animal feed. • Empty animal feed bag for learners to interpret labelling. • Weights. • Scales of different types to compare accuracy.
Lesson outline:	• Depending on Level of learners, begin by assessing learners' understanding of weight and the different units of measurement e.g. g and kg, ½ kg etc. • Ask farmer or RHET coordinator for samples of key ingredients in the animal feed they use. Look out relevant measuring scales for learners. • Use information from the farmer to devise problem solving scenarios for learners, e.g. provide learners with a summary of the ingredients in animal feed then ask learners to accurately weigh a specific amount to represent the weight of each ingredient. If unable to source the actual ingredients, use sand as an alternative. • Depending on Level, learners will be able to convert between different units e.g. kg to g, g to kg.
Follow up activities	Have a go at making your own hay. You can weigh the grass at the beginning and then at the end when the hay is made. How much water did the grass contain? Can you express this as a percentage?

Examples of learning from Primary 3 Pilot Project:
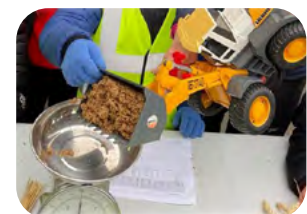

Weight in kg and g:
Learners working within First Level were provided with weights of different values to compare. Learners worked out the number of ½ kg weights required to make 1 kg.

Examples of learning from Primary 5 Pilot Project:

Weight in kg and g:
Learners visited the farm to meet their adopted cow for a second time as well as to learn more about nutritional information relating to animal feed. Learners weighed out the amount of each ingredient in g.

Weight in kg and g:
Learners visited the farm to meet their adopted cow for a second time as well as to learn more about nutritional information relating to animal feed. Learners weighed out the amount of each ingredient in g.

Feeding Time!

Learning Intention:

- I am learning to use common units of measurement.
- I am learning to convert between units of measurement when solving problems.

Find out information from the farmer about the ingredients in animal feed.
Complete the table below by adding the name of ingredient then use scales to measure
the weight of each ingredient:

Ingredient:	Weight of ingredient (g)	Weight of ingredient (kg)

Feeding Time!

Feeding Time – Take Two! Lesson plan

RHET

Learning Intention:	These activities aim to build on learners' concept of measurement (weight) on the farm by learning about composition of animal feed. Learners will continue to learn about the way dietitians provide farmers with nutritional information to optimise the health of cows and quality of milk production. Learners will explore fractions, decimals and percentages in a real life context, linking with feed their adopted cow eats.
Fractions, Decimal Fractions and Percentages:	• Having explored fractions by taking part in practical activities, I can show my understanding of: – how a single item can be shared equally – the notation and vocabulary associated with fractions – where simple fractions lie on the number line. **MNU 1-07a** • Through exploring how groups of items can be shared equally, I can find a fraction of an amount by applying my knowledge of division. **MNU 1-07b** • Through taking part in practical activities including use of pictorial representations, I can demonstrate my understanding of simple fractions, which are equivalent. **MTH 1-07c**
Resources:	• Data from farmer about percentage of ingredients used in animal feed. • Samples from animal feed sacks (from farm). • Empty animal feed bag for learners to interpret data. • Concrete materials e.g. peg boards and pegs to visualise fractions, percentages and decimal fractions.
Lesson outline:	• Assess learners' prior learning by linking back to learning about animal feed and ingredients used in it. • Ask farmer for samples of key ingredients in the animal feed they use. If not possible, look at examples online from distributors or RHET coordinator. • Use information from the farmer in addition to labelling on feeding bags to devise problem solving scenarios for learners at the appropriate Level. • e.g. At First level, link to fractions: • If silage is ½ of the ingredients, what fraction do the rest of the ingredients make up? • At Second Level, if 17% is concentrate, 10% draff, 2% hay, silage 59%, what percentage is whole crop? • Depending on Level, learners will be able to convert between fractions and percentages e.g. ¼ is concentrates is the same as saying 25% is concentrates and 0.25.
Follow up activities	Find out more about feeding and other on the farm maths problems.

LEARNER WORKSHEET
Feeding Time!

Learning Intention:
- I am learning to investigate problems in which fractions, percentages and decimal fractions are used.
- I am learning to solve problems linked to the percentage of ingredients in animal feed.

Using the information from the farmer about the ingredients in animal feed, work out the missing percentage. Use concrete materials to show the amount of each ingredient then use what you know about percentages to solve the missing ingredient.

Complete the table below to work out the missing percentage:

Ingredient:	Percentage (%)
Concentrate	17%
Draff	10%
Hay	2%
Silage	59%
Whole crop	?

Challenge

Complete the table below to calculate the missing fractions, decimal fractions and percentages.

Ingredient:	Fraction	Decimal fraction	Percentage
Concentrate		0.25	
Draff			25%
Silage	½		