



Theme 7: Animal breeding, fertility and calf management

EXAMPLES OF FORMULATED DAIRY MEAL



A publication sponsored by the ICSIAPL project

Examples of formulated dairy and beef meal



Learning objectives

- What are formulated (dairy/beef) meals?
- Importance of formulating dairy and beef meal.
- Nutritional requirements for dairy and beef cattle.
- Examples of formulated dairy and beef meal.
- Benefits and challenges of formulated meals.

Introduction to formulated dairy and beef meals

Formulated meals are specially designed, balanced diets that provide the necessary nutrients, energy, and minerals required to meet specific nutritional needs of dairy and beef cattle.

These meals are carefully crafted to optimize the health, growth, milk production (in dairy cattle), and meat production (in beef cattle) of the animals.

Examples of formulated commercial dairy and beef meals popular in Kenya are listed below.

Dairy meal (Standard & High yield) for lactating cows.

- Heifer meal
- Calf pellets
- Feedlot finishing
- Fattening steers
- Rangeland cubes



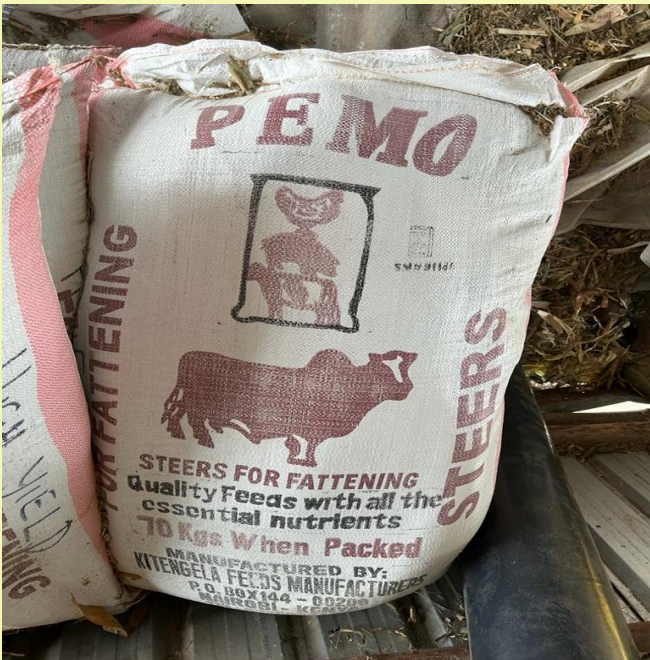
A mature Boran bull

What to consider before formulating meals

Complement available forages: Formulated meals are meant to complement the forages available on the farm. Farmers must check the quality of their forage through analysis or make an on-farm assessment. If the quality of the forages is low, then there is need to formulate a meal (mixture of single source ingredients) to meet the animal's nutritional requirements.

Nutrient composition: Formulated meals are made to meet the nutritional requirements of dairy and beef cattle. This includes the right balance of carbohydrates, proteins, fats, vitamins, and minerals necessary for growth, reproduction, milk production, and overall health.

Availability of feed ingredients: Homemade mixes should make use of locally available feeds such as grains (maize, wheat, rice), and protein supplements (soybean meal, cottonseed meal, sunflower meal).



Picture of meal for fattening steers – Kitengela Feeds Manufacturers

Precision feeding: This involves calculating the exact amount of feed each animal needs based on its age, weight, and production stage. This ensures that each animal receives the appropriate amount of nutrients, minimizing waste and maximizing efficiency.

Quality ingredients: The quality of the ingredients used in formulated meals is crucial. Quality feed ingredients give consistent formulated meals and ensures the safety and health of the cattle.

Cattle health: Farmers and nutritionists must closely monitor the cattle's performance and adjust the formulated meals as needed. This allows fine-tuning of the diet to achieve the desired outcome.



Proper hydration is important after feeding on formulated meals

Comparative Energy Values of Commonly Used Single Source Ingredient Grain Used To Formulate Compounded Meals

Year 2023	Metabolisable Energy on DM basis	Dry Matter	Metabolisable Energy on As Fed basis	Cost range KES/kg as purchased /produced (farm gate price)			Cost range of ME KES/MJ of ME		
				Low	Med	High	Low	Med	High
Feed ingredients in dairy cow diet	(MJ/kg DM)	(g/kg)	(MJ/kg)	Low	Med	High	Low	Med	High
Barley grain	12.3	886	10.9	25	34	43	2.29	3.12	3.95
Cotton seed meal moderate quality	10.4	910	9.5	55	68	80	5.81	7.13	8.45
Dairy meal high yield	12.7	890	11.3	45	50	55	3.98	4.42	4.87
Lucerne pellets	9.3	905	8.4	50	75	100	5.94	8.91	11.8
Maize (grain)	13.9	886	12.3	55	63	78	4.47	5.12	6.33
Maize bran	11.9	887	10.6	27	31	35	2.56	2.94	3.32
Maize germ	12.2	886	10.8	30	35	46	2.78	3.24	4.26
Molasses	12.1	758	9.2	20	60	100	2.18	6.54	10.9
Rapeseed	21.1	924	19.5	60	75	80	3.08	3.85	4.10
Rapeseed meal (Canola)	11.8	900	10.6	65	70	75	6.12	6.59	7.06
Sorghum (grain)	13.1	889	11.6	38	44	49.5	3.22	3.74	4.25
Sunflower seed meal low quality	10.1	907	9.2	31	45	60	3.38	4.91	6.55
Wheat (grain)	13.3	885	11.8	50	60	70	4.25	5.10	5.95
Wheat bran	11.1	885	9.8	15	25	35	1.53	2.54	3.56

Feed formulation methods

Pearson Square Method

The Pearson Square method is a simple graphical approach used for formulating dairy meals with two feed ingredients.

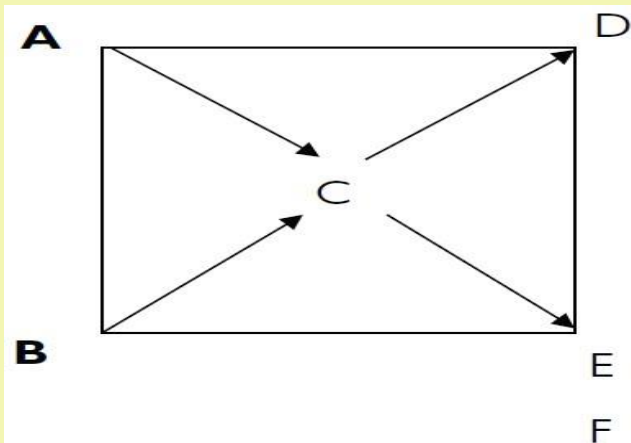
It involves creating a square with two diagonal lines, each representing the percentage of a specific nutrient in one of the feed ingredients.

Approach

Obtain D by subtracting C from B (or B from C) (always subtract the lesser value from the greater on the diagonal to ensure a positive answer).

Obtain E by subtracting C from A (or A from C) (always subtract the lesser value from the greater on the diagonal).

Visualization of the Pearson Square method



Where:

A = nutrient concentration of first feedstuff

B = nutrient concentration of second feedstuff

C = nutrient level required in ration

D = required proportion (parts) of first ingredient in diet

E = required proportion (parts) of second ingredient in diet

F = Total of the different parts (D+E) making the ration

Sum D and E to obtain F ($D + E = F$). For ease of mixing these (D and E) are often recalculated in percentage form to mix 100kg.

Example:

Make a ration with 18% CP using Cotton seed cake (CSC) (40% CP) and maize grain (10% CP).

- 1.) $C - B = 18 - 10 = 8$ (D) (parts of CSC required)
- 2.) $A - C = 40 - 10 = 30$ (E) (parts of maize meal required)
- 3.) $D + E = 8 + 22 = 30$.
- 4.) To achieve a mix with 18% CP, mix 8 parts cottonseed cake and 22 parts maize.

Expressed as a percentage of for example 100 kg feed.

- 1.) $8/30 * 100 = 26.7\%$ CSC
- 2.) $22/30 * 100 = 73.3\%$ maize grain

Example of the Pearson Square method

CSC 40% (A)	8 parts CSC (D)
18% (C)	
Maize (10%) (B)	<u>22 parts maize (E)</u>
Total	30 parts (F)

Where:

A = nutrient concentration of first feedstuff

B = nutrient concentration of second feedstuff

C = nutrient level required in ration

D = required proportion (parts) of first ingredient in diet

E = required proportion (parts) of second ingredient in diet

F = Total of the different parts (D+E) making the ration

To confirm that the ration contains 18% CP:

- $CSC: 26.7 \times (40/100) = 10.7$
- $maize: 73.3 \times (10/100) = 7.3$
- $Total = 10.7 + 7.3 = 18\% \text{ CP in } 100\text{kg mixture (18\%)}$

From this example, the CP of the resulting mixture cannot be higher than 40% or lower than 10%. This shows that the quality of your feed ingredients, determines the quality of the formulated meal.

Limitations:

This method doesn't consider the cost of the ingredients used in feed formulation.



Standard dairy meal formulated for dairy cows that have a production of 7-15 litres of milk per day - JUMBO FEEDS LTD

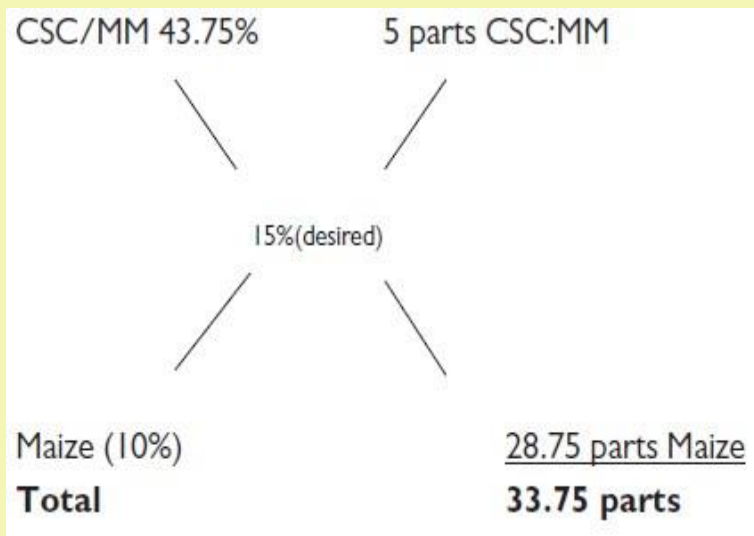
Pearson Square method with three or more feed resources

Extending the Pearson Square to more than two ingredients becomes cumbersome due to the complexity of the graphical representation. It is rarely used for formulations with three or more feed resources.

Limitations:

The graphical representation becomes confusing with more ingredients. The accuracy of the feed formulation decreases as the number of ingredients increases.

Pearson Square Method more than 2 feed resources



Pearson Square Method Example- Gachuri, C. and Lukuyu, B. 2021. Feed formulation and mixing for small-scale feed producers. ILRI Manual 45

Algebraic Equations

Algebraic equations involve setting up mathematical equations based on nutrient requirements and feed ingredient nutrient compositions.

By solving these equations, you can determine the amount of each feed ingredient required to meet the nutrient needs of the dairy cattle.

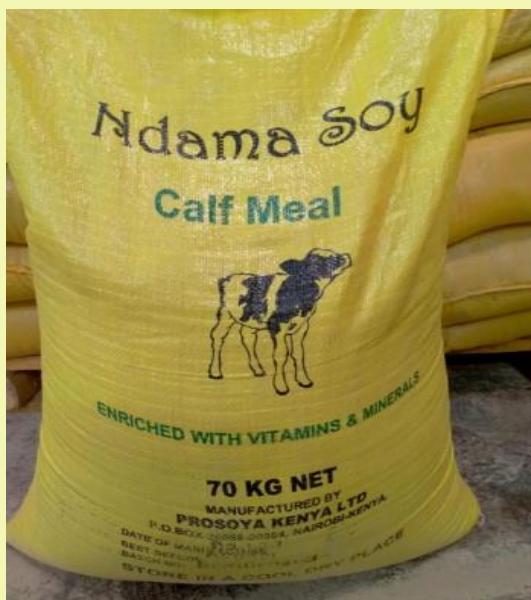
This method can handle multiple ingredients and is more precise than the Pearson Square method for complex formulations.

Limitations:

It requires a good understanding of Algebra.

The manual calculations can be time-consuming.

The method has limited ability to quickly adapt to changing ingredient prices or availability.



Ndama Soy Calf Meal - Prosoya Kenya Ltd

Substitution method

The substitution method involves systematically replacing one feed ingredient with another while keeping nutrient levels constant. It allows for cost reduction by replacing expensive ingredients with cheaper options or when specific ingredients are in short supply.

Limitations:

The graphical representation becomes confusing with more ingredients.

The accuracy of the feed formulation decreases as the number of ingredients increases.

Visualization of The Substitution Method

Original formula			
Ingredient	amount (kg)	CP%	CP contribution (kg)
Rhodes hay	50	8	4
Maize grain	35	10	3.5
CSC	15	40	6
	100		13.5



New formula			
Ingredient	amount (kg)	CP%	CP contribution (kg)
Rhodes hay	50	8	4
Maize grain	30	10	3
CSC	20	40	8
	100		15

Trial and Error Method

In this method, different feed ingredient combinations are tried until the desired nutrient levels are met.

It involves utilizing computer-based software, such as Excel spreadsheets, to continuously adjust ingredient ratios based on the previous outcome, ultimately leading to the attainment of the final objective.

Limitations:

Highly inefficient and time-consuming, especially for complex formulations.

May lead to excessive ingredient waste.

Limited accuracy and control over nutrient balance.

Visualization of “Trial and Error” method

Ingredient	Ingredient contribution			Nutrient content of ingredients/feed			
	T1*	T2*	T3*	ME (Kcal/kg)	CP (%)	Ca (%)	Available P (%)
Maize grain, ground	40	55	62	3,300	10.0	0.03	0.15
Pollard	30	20	15	1,800	16	0.13	0.45
CSC	15	13	6	2,000	35	0.18	0.33
Fish meal	8	5	8	3,000	55	2.0	1.5
Limestone	5	6	7	0	0	33	0
Dicalcium phosphate(DCP)	2	1	2	0	0	23	18
Total	100	100	100				
T1*				2,400	18.45	2.348	0.7245
T2*				2,585	16	2.375	0.4704
T3*				2,676	15.1	2.978	0.6603
Requirement				2,750	16.0	3.0	0.45

Trial and Error Method - Gachui, C. and Lukuyu, B. 2021. Feed formulation and mixing for small-scale feed producers. ILRI Manual 45

Computer based diet formulation with least cost option

This advanced method uses a software application such as Rumen8, to formulate balanced diets by considering nutrient requirements, ingredient costs, and constraints.

It uses optimization algorithms to find the least-cost diet formulation that meets the nutritional needs different animal categories.

This system is highly efficient, effortlessly managing a wide range of ingredients, while also rapidly adapting to shifts in ingredient prices and availability.

Once a balanced diet has been formulated the specific ingredients for a dairy or beef meal can separated for the mixture.

Rumen8 balanced diet formulation

The screenshot displays the Rumen8 software interface for diet formulation. The main window is titled 'Beef' and contains several input fields and controls for defining the animal and diet parameters.

Animal Selection: A dropdown menu is set to 'Bull'. Below it, there are 15 numbered rows for selecting ingredients, each with a dropdown menu and two numerical input fields for 'DM' and 'As-fed' values, both currently set to 0.00.

Animal Characteristics:

- Breed:** A dropdown menu is set to 'East African Zebu'. Below it, another dropdown is set to 'Boran'.
- Live weight (kg):** 250
- Live weight change (kg/d):** 0.00
- Days since calving:** 0
- Days in calf:** 0
- Number of animals in herd:** 1
- Age (years):** 2.5
- Carcase dressing (%):** 50
- Live weight at sale (kg):** 350
- Penned:**
- Hormone growth promotant:**
- Milk:** Radio buttons for 'Automatic', 'Entered', and 'None' (selected).
- DML estimation method:** Radio buttons for 'Young stock', 'Feedlot', 'General AFRC', 'General NRC' (selected), 'Cow', and 'NDF intake'.
- Farm terrain:** Radio buttons for 'Flat' (selected), 'Undulating', and 'Steep'.
- Distance walked (km/d):** 0.5

Summary and Results:

- Total daily intake (kg/d):** 0.0 (DM), 0.0 (As-fed)
- Feed costs:**
 - Ksh/t DM: -
 - Ksh/MJ ME: -
 - Ksh/kg CP: -
 - Ksh/head/d: -
- Feed efficiency:**
 - FCR feed/lw gain (kg): -
 - Gain:Feed (kg/kg DM): -
 - Feed % income: -
 - Ksh Feed/Ksh Gain: -
- Margin:**
 - Ksh/head/d: -
 - Ksh/herd/d: -
 - Income (Ksh/d): 0
 - Live weight change (kg/d): 0.00

Rumen8 software interface

Computer based diet formulation with least cost option

Limitations:

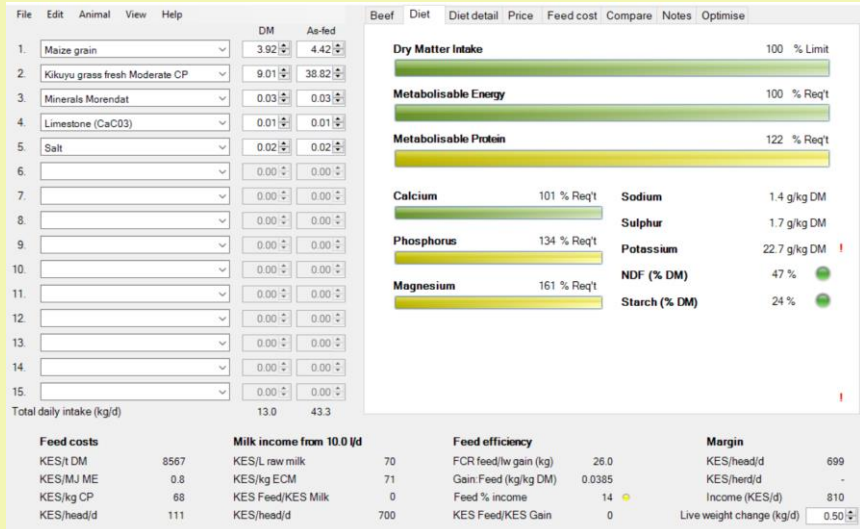
Initial training is advisable and recommended.

Rumen8 software application is free but other professional software application may be costly for coaching in Kenya.

Diet formulation requires knowledge of ruminant nutrition, is complex and not easily applied by small-holder farmers.

The recommendations (output) produced are only as reliable as the data (input) used. Unreliable or wrong data will produce incorrect recommendations.

Rumen8 balanced diet formulation



Rumen8 software interface

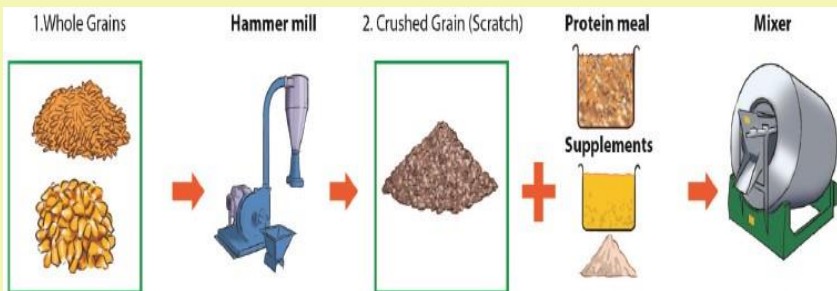
Feed milling and mixing

Ingredient selection and milling

Feed milling and mixing is the production of complete and balanced cattle rations through a series of processes, including ingredient preparation, grinding, mixing, and possibly pelletizing. This involves:

Ingredient selection: Procure good quality raw ingredients such as grains (maize, wheat, rice), protein sources (soybean meal, canola meal, sunflower meal), forages, vitamins, minerals, and additives (like yeast, toxin binders, buffers).

Grinding and particle size reduction: Some ingredients are ground to make them more digestible and ensure uniformity in the mixture. For instance, grains are typically ground to increase their surface area.

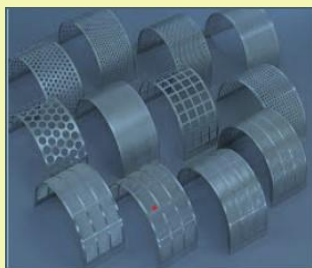
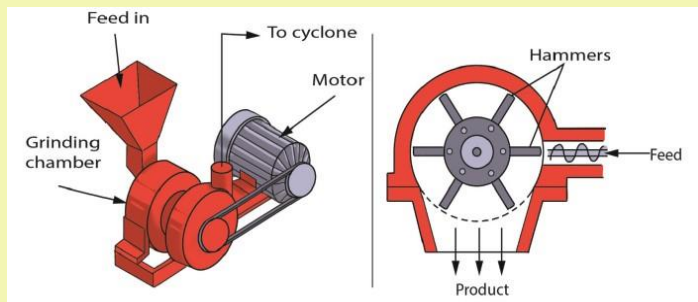


Weighing and mixing of feed ingredients

Hammer mills are commonly used to decrease the particle size of grains such as maize. They have a set of hammers which crush the grains into smaller particles, making them more suitable for mixing and easier for cattle to digest.

Proportioning (weighing): Accurately measure and proportion each ingredient according to the predetermined formula for the dairy or beef meal being prepared.

Mixing process: Once the ingredients are properly measured, they are introduced into a mixing apparatus. This machines thoroughly blend the milled ingredients to achieve a homogenous mixture. Common mixing equipment used are batch (vertical or horizontal) mixers and inclined mixers.



Sieves are used to determine the size of grind output of the hammer mill.

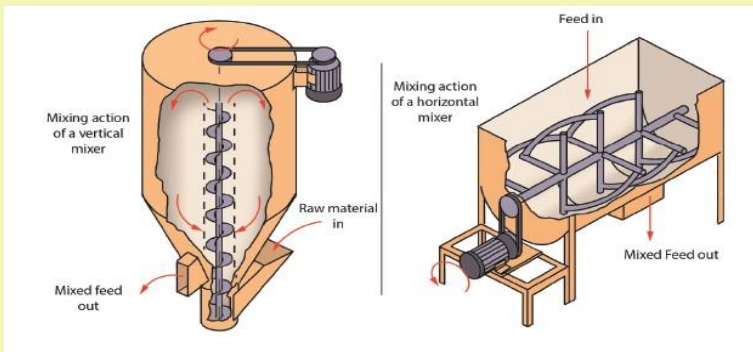
Picture showing the different parts of a hammer mill – ILRI Manual45

Mixing of the feed ingredients

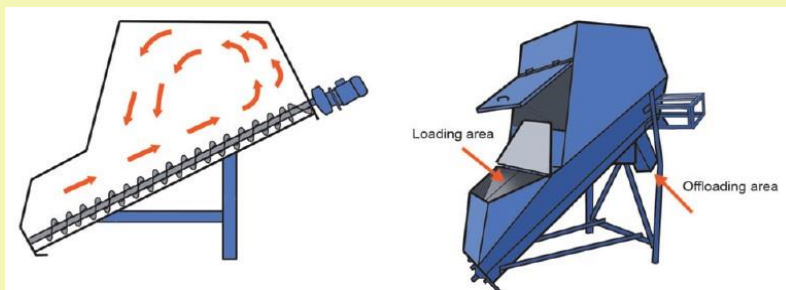
Horizontal mixer: It quickly blends liquids (5-10 minutes) and handles heavy or sticky materials like oils or molasses well. It is also easy to empty but it's costlier to buy and it consumes more power. Loading it can be challenging.

Vertical mixer: It is cost-effective due to low power usage, but it takes longer to mix. While it saves space, it has downsides such as inadequate liquid mixing, heavy particle settling, uneven blending, and incomplete emptying.

Inclined mixer: It blends the features of batch mixers with a 30° incline and outperforms them by ensuring continuous mixing. This results in improved production efficiency and consistent feed quality.



Picture of vertical and horizontal batch mixers – ILRI Manual45



Picture of an inclined auger mixer - - ILRI Manual45

Packaging and storage of dairy & beef meals

Packaging and storage: After achieving proper mixing, it's crucial to store and handle the mixed feed correctly to preserve its quality until it's delivered to the cattle's feeding troughs.



Picture of Standard and High Yield Dairy Meal in Kenya – Menengai Afya Feeds

Dairy meal mixes for lactating cows

Dairy meal for lactating cows

To maintain milk production and overall health, dairy cattle need:

- Protein
- Carbohydrates
- Fat
- Vitamins and minerals

The ratio of each nutrient source in the formulated meal varies depending on the cow's production stage, that is, lactation, steers or heifer stage.

There are 2 commercial compounded meals commonly used for dairy cows, that is, High Yield and Standard dairy meal.

High Yield dairy meal is generally said to have about 18% crude protein (CP) while Standard dairy meal has about 14-16% crude protein (CP). See image on the left with KEBS standards for compound feed for different animal categories

	Dairy calves	Heifers	Mature cows
Moisture (max)	12	12	12
Crude protein (min)	18	14-16	14-16
Non-protein N (max)	0	2	2
Crude fibre (max)	8	12	12
Crude fat (max)	3.0-8	3-6	3-6
Calcium (min)	0.7	0.7	0.7
Phosphorus (min)	0.5	0.5	0.5
Common salt	0.5-0.6	0.5-0.6	0.5-0.6

Kenya Bureau of Standard dairy meal specification

Nutrient composition: In arid and semi-arid regions, forage quality may be lower, leading to inadequate protein intake for dairy cattle. Therefore, dairy meal must prioritize the cow's increased protein and energy demands to support milk production during lactation.

Ingredient choices: They typically include forages that can survive on low moisture, energy-dense grains (e.g. whole maize grain, maize bran, maize germ, wheat bran and pollard, rice bran and polish), and protein sources like soybean meal, cottonseed meal, sunflower meal, or canola meal.

Nutrient ratios: High protein-to-energy ratios to meet the demands of lactation.



Lactating Cows need extra supplementation for her to meet her nutritional requirements

Formulating a meal for dairy cows

It is important to formulate the meal based on the quality of forages available at the farm however most farms base the forages to use on the dairy meal.

Dairy cows need a meal that has an energy density of more than 11MJ ME/kg DM and crude protein of 15-16%.

Example 1 :

If hay of Rhodes grass (low crude protein content) is available, the farmer can mix on farm, for example, the following single source ingredients (percentage on dry matter basis) to make a compound dairy meal:

- Wheat bran 14%,
- Cotton seed cake 6%,
- Sunflower seed meal 6%,
- Maize germ meal 58%,
- Molasses 12% .
- Dicalcium phosphate 1%,
- Limestone 3%,

The meal above has approximately an energy density of 11.3 MJ/kg DM and crude protein 15.%.



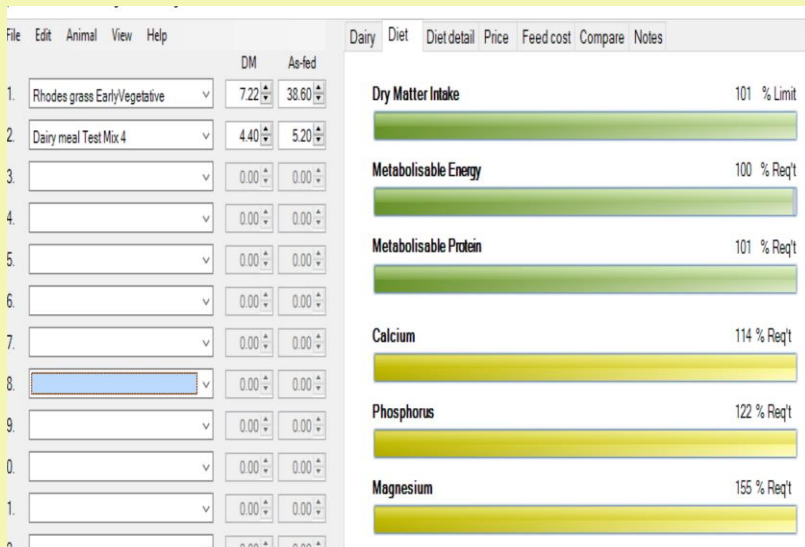
Picture of a dairy meal in the Kenyan market

Example 2 :

If the farmer feeds the cows on Rhodes grass / Lucerne mixture which is harvested and fed or grazed at an early vegetative stage, the farmer can mix, for example the following single source ingredients (percentages on dry matter basis) to make a compound dairy meal:

- Maize grain 40%,
- Wheat Bran 20%,
- Sunflower seed meal 8%,
- Limestone 2%,
- Molasses 31%

The meal as listed above has an approximate energy density of 12.2 MJ/kg DM and crude protein 11.1%. This meal complements the high protein level of Rhodes grass /Lucerne mix at early vegetative stage



A picture of the Rumens8 diet formulation software showing the cow's nutritional requirement met; a cow weighing 450kg and producing 10ltr the mix of Rhodes at early vegetative and the dairy meal mix listed on the left

Beef meal mixes for fattening and finishing

Essential nutrients for beef cattle.

- Carbohydrates
- Protein
- Minerals and Vitamins



A Sahiwal bull at the KALRO- Dairy Research Institute in Naivasha

Finishing mixtures

Diets for finishing cattle focus on rapid weight gain and marbling for meat quality.

Rapid weight gain: These mixtures are designed to maximize weight gain in a short time. At this stage, we reduce reliance on forage as concentrates become the primary energy source.

The diet in feedlots is predominantly concentrates, at times with a forage-to-concentrate ratio of 20:80 at the end of the finishing period. Energy-dense concentrate diets like whole maize grain, are used to promote rapid weight gain in the beef cattle.

Marbling of meat is achieved by developing white streaks of fat within the lean muscle tissue of beef cattle. Marbling is especially important for high-quality beef products and is a key factor in grading and determining beef quality.

Marbling considerations: To get meat that is marbled on beef cattle high-energy ingredients are included in beef meal in the last 90-120 days before slaughtering the animal. These energy-dense ingredients are for example:

- Molasses
- Maize grain,
- Maize by products like bran or germ
- Rice byproducts like bran and polish
- Wheat by products like bran and pollard

Supplementing with oil rich ingredients: Adding seed oils to the meal enhances energy density and marbling in the meat.



Picture of cows just after supplementation in a feedlot system – are kept between 90-100 days

When fattening steers, the fattening meal is required to have higher energy density than that of dairy cows of more than 11 MJ/kgDM while crude protein (CP) level can be slightly lower between 13-14%.

Example 1:

We assume that good quality hay with moderate CP content is available in this example, the fattening meal mix can contain, on an as fed basis for example:

- Cotton seed 5%
- Maize grain 21%,
- Molasses 4%
- Sunflower seed meal 14%
- Wheat bran 54%
- Salt 1%,
- Minerals 1%,

The meal above has an energy density of 11.5MJ/kg DM and Crude protein level of 16%.



A picture of a Boran steer

When fattening steers, the fattening meal is required to have higher energy density than that of dairy cows of more than 11 MJ/kg DM while crude protein (CP) level can be lower between 11-14%.

Example 2:

We assume that good quality hay with high CP content is available in this example, the fattening meal mix can contain, on as fed basis for example:

- Cotton seed 14%
- Maize grain 73%,
- Molasses 4%
- Wheat bran 7%
- Salt 1%,
- Minerals 1%,

The meal above has an energy density of 13.1MJ/kg DM and Crude protein level of 11%.



Picture of a Boran steer.

Growing youngstock in a beef herd

Growth stage requirements: Diets for heifers focus on growth and development.

Nutrient-dense formulations: High-protein, energy-dense diets to promote optimal growth and body condition.

Special considerations: Formulations often consider heifer weight and age to tailor nutrient levels.



Picture of a Sahiwal heifer

Mixes for growing youngstock

Example 1

We assume hay of good quality with moderate crude protein is available . A meal for growing youngstock could then contain for example;

- Cotton seed meal 15%
- Cotton seed 14%
- Maize grain 52%,
- Molasses 4%
- Wheat bran 13%
- Salt 1%,
- Minerals 1%,

This meal for youngstock has an energy density of 12.4 MJ/kg DM and crude protein (CP) of 16%



Picture of Sahiwal Heifers

Mixes for growing youngstock

Example 2

We assume grass is available for grazing or feeding and utilized at early vegetative stage. A meal for growing youngstock could then contain for example;

- Sunflower seed meal 8%
- Maize grain 35%,
- Maize germ meal 10%
- Wheat bran 14%
- Wheat pollard 17%
- Broken wheat 14%
- Salt 1%,
- Minerals 1%,

This meal for youngstock has an energy density of 12.3 MJ/kg DM and crude protein (CP) of 14%



A picture of weaned Boran heifers

Fat content in formulated dairy and beef meal

Growing heifers: Starter feeds for young dairy and beef calves often contain lower levels of fat, typically ranging from 2% to 4% fat.

Lactating cows: Their dairy meal should contain higher fat levels, ranging from 3% to 6% fat because they have higher energy requirements to support milk production.

Finishing cattle: When beef cattle are fattening for slaughter, their feedlot diets may include higher levels of fat, around 5% to 10% or more, depending on the desired outcome.



Picture of cotton seed cake which adds the highest crude fat content of up to 3.5% in formulated meal mixes

Anti-nutritional factors in formulated dairy and beef meals

Trypsin inhibitors: These compounds hinder protein digestion, impacting milk production in dairy cows and growth in beef cattle. To mitigate these effects, farmers should balance soybean meal with other protein sources like cottonseed meal or sunflower meal.

Gossypol: Cottonseed meal contains gossypol which is toxic to cattle, particularly calves, causing infertility, early pregnancy loss, and slower weight gain. Farmers should balance protein ratios using soybean and sunflower meals.

Phytates: These compounds bind to vital minerals like calcium, magnesium, and zinc, impeding their absorption by cattle. This can result in delayed calf bone development. To counteract this effect, diets include mineral supplements to make up for reduced mineral absorption.



Mother and calf (Boran) cows resting to conserve energy during the hot daytime sun

Feed additives

Feed additives are ingredients added to a cattle's basic feed mix to improve its health, nutrition, or growth. These additives serve various purposes, such as enhancing nutrient absorption, promoting growth, improving digestion, preventing diseases, and optimizing feed efficiency. A few types of additives used in cattle feed include:

- **Mycotoxin binders**: They combat the harmful effects of fungal toxins produced by mold in feed ingredients. They attach themselves onto mycotoxins in the cow's digestive tract and prevent their entry into the cow's bloodstream.
- **Buffers**: Buffers like sodium bicarbonate are used to regulate the pH levels in the rumen, preventing acidosis, which can occur when cattle are fed high-grain diets.
- **Yeast**: Yeast cultures, such as *Saccharomyces cerevisiae*, can enhance rumen fermentation and microbial activity, leading to improved fiber digestion and increased energy utilization.



Picture of yeast additive used in cattle feed – CKL Kenya

Summary and key messages

Ingredients matter: Select high quality locally available ingredients when formulating your meals. The nutritional quality of your formulated meal cannot exceed the original ingredients used.

Mineral and vitamin supplements: Formulated meals should incorporate mineral and vitamin supplements to address deficiencies in your specific region to support overall cattle health.

Cost: As a rule of thumb, ensure that the cost of 1kg of the formulated meal is equal or less to the price of 1 litre of milk produced by your dairy cow.



A mature Boran bull at the watering dam



Ministry of Foreign Affairs of the Netherlands

About the ICSIAPL Project

The Integrated & Climate Smart Innovations for Agro-Pastoralist Economies and Landscapes in Kenya's Arid and Semi-arid Lands is (ICSIAPL) is a three-year (2021 -2023) project funded by the European Union (EU) and the Ministry of Foreign Affairs of the Kingdom of the Netherlands (DGIS). It is managed through a delegated cooperation with the Embassy of the Kingdom of the Netherlands (EKN) in Nairobi.

The EU fund is attached to the DeSIRA Initiative (Development Smart Innovation through Research in Agriculture).

The project is implemented by SNV Netherlands Development Organisation, SNV, (lead partner) and the Kenya Agriculture Livestock Research Organization, KALRO (research partner).

