

# FAO Ration Tool

## Training course

*Before going through the course, please ensure that your file is opening and that you've read user guide.*

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | Ration calculation | Milk Income less Feed Cost (MIFC) | Acknowledgment

Data inputs		Energy needs	
Live weight (kg)	475	51,891	MJ ME/d
Pregnancy (mth)	2	0	MJ ME/d
Milk volume (kg)	10	47,3	MJ ME/d
Milk fat (%)	3,3		
Milk protein (%)	2,8		
Live weight gain/loss (kg/d)	0	0	MJ ME/d
Stage of lactation	Early lactation		

**Dairy Cow Calculator**

Needs

Energy	99,191
Crude Protein	2,28
Ca	114
P	57
Max intake	14,25
NDF min	30
Concentrate max	50

Feed Cost 49,75



This course is organized in 3 modules:

1. Program launch
2. Data input and control
3. Ration formulation



Food and Agriculture Organization  
of the United Nations

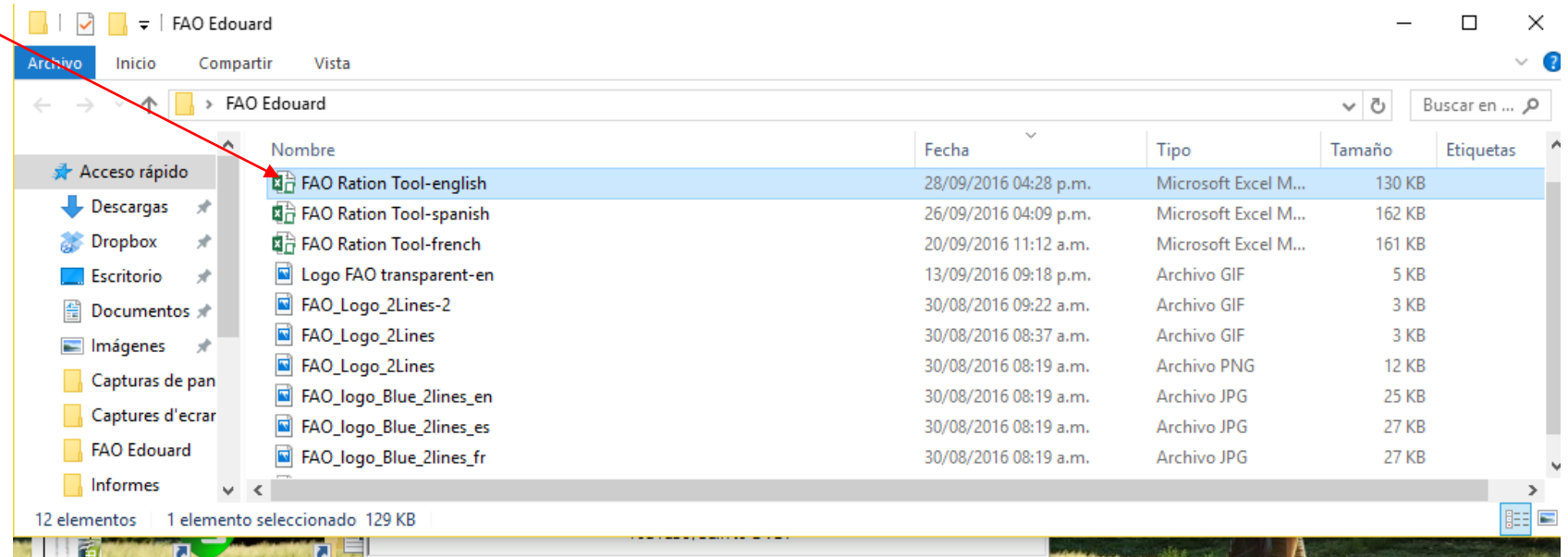
FAO Ration Tool – Training course  
Program launch

# 1.Program launch

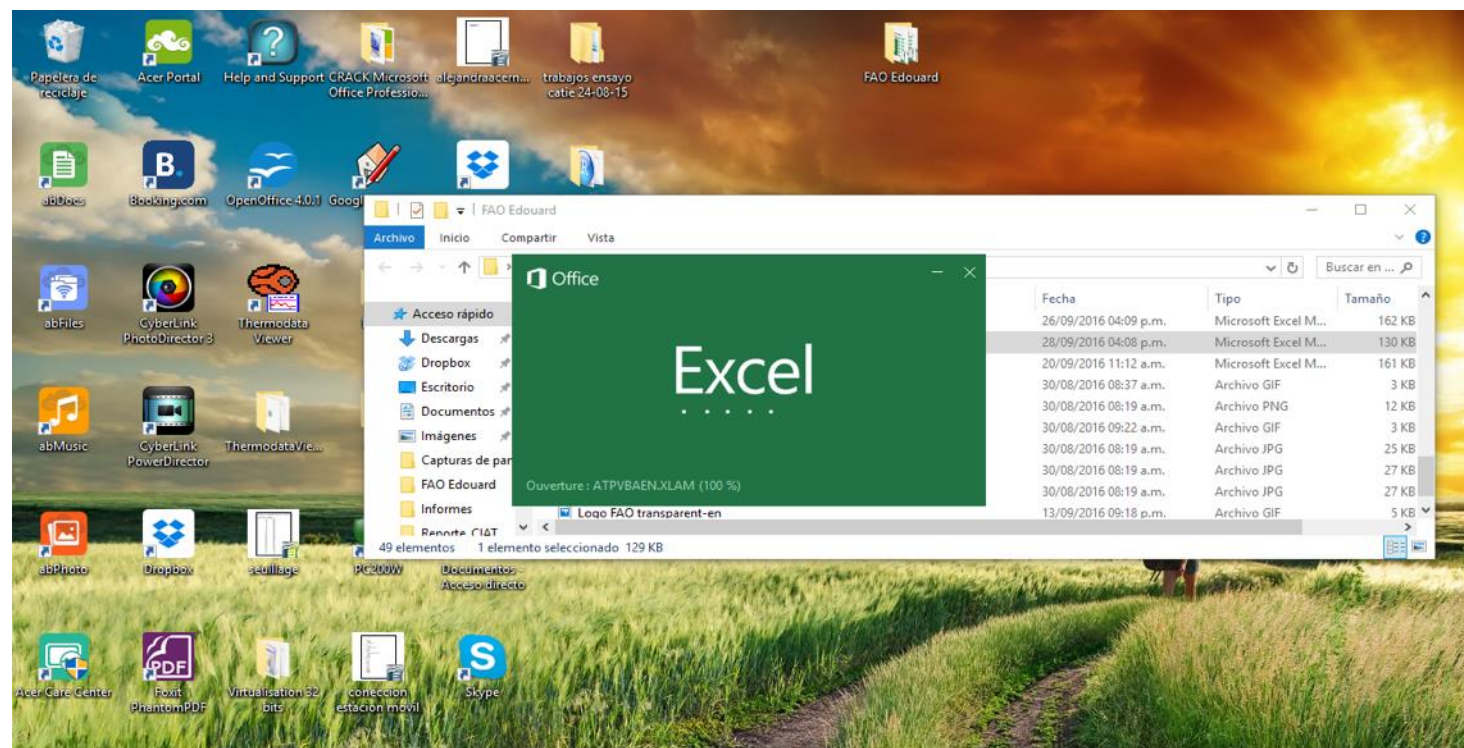


# 1.Program launch

Open the folder where your file named "FAO Ration Tool-english" has been saved and double-click on it



The Excel file is opening...





Then the user form is displayed as follow:

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | Ration calculation | Milk Income less Feed Cost (MIFC) | Acknowledgment

**Data inputs**

Live weight (kg)	475
Pregnancy (mth)	2
Milk volume (kg)	10
Milk fat (%)	3,3
Milk protein (%)	2,8
Live weight gain/loss (kg/d)	0
Stage of lactation	Early lactation

**Energy needs**

51,891	MJ ME/d
0	MJ ME/d
47,3	MJ ME/d
0	MJ ME/d

**Dairy Cow Ration Calculation**

Calculate ration

Needs		Intake	
Energy	99,191	116	MJ/d
Crude Protein	2,28	2,48	kg/d
Ca	114	13,17	g/d
P	57	24,19	g/d
Max intake	14,25	12,42	kg DM/d
NDF min	30	50,32	% DM
Concentrate max	50	29,59	% DM

Feed Cost (/d) 49,75

MIFC (/d) 70,25

Ration price (/kg) 1,07

Admin | Print | Quit





Then the user form is displayed as follow:

If the user form is not  
displayed on your screen

If you see the Excel file  
and not the user form

if you get an error  
message

*Please check in the user  
guide or contact your  
administrator.*

The screenshot displays the 'FAO Ration Tool' window with the 'Dairy Cow Ration Calculation' form. The form is divided into several sections:

- Navigation tabs:** Cow data, Ration calculation (active), Milk Income less Feed Cost (MIFC), and Acknowledgment.
- Data inputs:** A table for entering cow data.

Parameter	Value
Live weight (kg)	475
Pregnancy (mth)	2
Milk volume (kg)	10
Milk fat (%)	3,3
Milk protein (%)	2,8
Live weight gain/loss (kg/d)	0
Stage of lactation	Early lactation
- Energy needs:** A table showing calculated energy requirements.

Parameter	Value	Unit
Energy	51,891	MJ ME/d
Crude Protein	0	MJ ME/d
Ca	47,3	MJ ME/d
P		MJ ME/d
Live weight gain/loss	0	MJ ME/d
- Calculate ration:** A table showing the calculated ration and its components.

Parameter	Value	Unit
Energy	99,191	MJ/d
Crude Protein	2,28	kg/d
Ca	114	g/d
P	57	g/d
Max intake	14,25	kg DM/d
NDF min	30	% DM
Concentrate max	50	% DM
- Feed Cost and MIFC:** A table showing the feed cost and MIFC.

Parameter	Value	Unit
Feed Cost	49,75	/d
MIFC	70,25	/d
- Ration price:** A table showing the ration price.

Parameter	Value	Unit
Ration price	1,07	/kg

At the bottom of the form, there are buttons for 'Admin', 'Print', and 'Quit'.



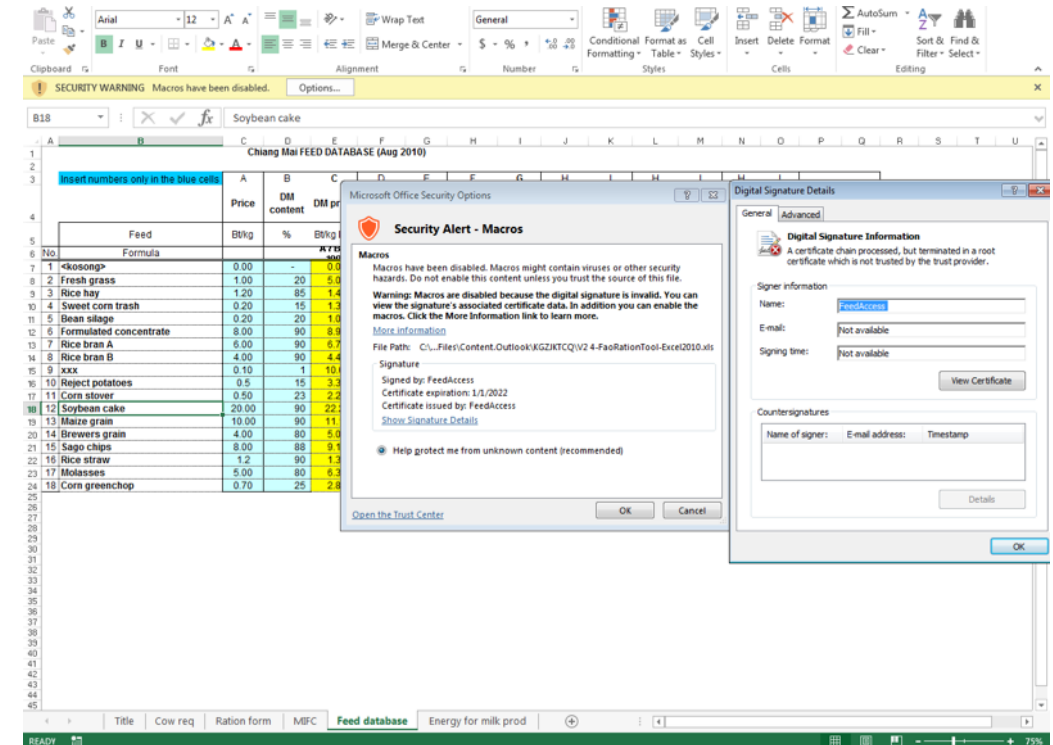
## Most common errors:

The user form is not displayed on  
your screen

The Excel table is visible

You have an error message

*There are chances this is related to  
the authorization of macros  
programs or because your using a  
non compatible version of Excel*







## Most common errors:

The user form is not displayed on  
your screen

The Excel table is visible

You have an error message

*There are chances this is related to  
the authorization of macros  
programs or because your using a  
non compatible version of Excel*

## Solutions:

- Authorize macros if you can  
(see user guide procedure),  
or contact your IT  
department
- Upgrade to Excel 2013 or  
later version



## 2. Data input and control

### 2.1 Feed database

- Click on the « Admin » button

The screenshot displays the FAO Ration Tool interface. The main window is titled 'Dairy Cow Ration Calculation' and features a blue header with the FAO logo and the text 'Food and Agriculture Organization of the United Nations'. Below the header, there are four tabs: 'Cow data', 'Ration calculation', 'Milk Income less Feed Cost (MIFC)', and 'Acknowledgment'. The 'Ration calculation' tab is active, showing a 'Data inputs' section on the left and an 'Energy needs' section on the right. The 'Data inputs' section contains several input fields: 'Live weight (kg)' (475), 'Pregnancy (mth)' (2), 'Milk volume (kg)' (10), 'Milk fat (%)' (3,3), 'Milk protein (%)' (2,8), 'Live weight gain/loss (kg/d)' (0), and 'Stage of lactation' (Early lactation). The 'Energy needs' section shows '0 MJ ME/d'. An 'Admin access' dialog box is open in the center, prompting the user to 'Enter password' with 'OK' and 'Annuler' buttons. At the bottom left, there is an 'Admin' button, which is highlighted by a red arrow from the text 'Click on the « Admin » button'. The bottom right of the interface includes a 'Calculate ration' button, a 'Print' button, and a 'Quit' button. The 'Calculate ration' button is disabled. The 'Print' and 'Quit' buttons are also disabled. The 'Admin' button is enabled. The 'Admin' button is located at the bottom left of the interface, below the 'Data inputs' section.

Needs	Intake
99,191	116 MJ/d
2,28	2,48 kg/d
114	13,17 g/d
57	24,19 g/d
14,25	12,42 kg DM/d
NDF min 30	50,32 % DM
Concentrate max 50	29,59 % DM

Feed Cost (/d)	MIFC (/d)	Ration price (/kg)
49,75	70,25	1,07



## 2. Data input and control

### 2.1 Feed database

- Click on the « Admin » button
- Enter password « FAO2016 » and click Ok

The screenshot displays the 'FAO Ration Tool' interface. At the top, the FAO logo and name are visible. The main window is titled 'Dairy Cow Ration Calculation'. It features several tabs: 'Cow data', 'Ration calculation', 'Milk Income less Feed Cost (MIFC)', and 'Acknowledgment'. The 'Ration calculation' tab is active, showing 'Data inputs' and 'Energy needs' sections. A red arrow points from the 'Admin' button at the bottom left to a password prompt dialog box. The dialog box has a title bar 'Admin access' and contains the text 'Enter password' with 'OK' and 'Annuler' buttons. The background interface includes various input fields for cow data (Live weight, Pregnancy, Milk volume, Milk fat, Milk protein, Live weight gain/loss, Stage of lactation) and calculated values (Intake, NDF min, Concentrate max, Feed Cost, MIFC, Ration price).

Input	Value
Live weight (kg)	475
Pregnancy (mth)	2
Milk volume (kg)	10
Milk fat (%)	3,3
Milk protein (%)	2,8
Live weight gain/loss (kg/d)	0
Stage of lactation	Early lactation

Output	Value
Intake (MJ/d)	116
Intake (kg/d)	2,48
Intake (g/d)	13,17
Intake (g/d)	24,19
Intake (kg DM/d)	12,42
Intake (% DM)	50,32
Intake (% DM)	29,59

Output	Value
NDF min	30
Concentrate max	50
Feed Cost (/d)	49,75
MIFC (/d)	70,25
Ration price (/kg)	1,07



## 2. Data input and control

### 2.1 Feed database

- Click on the « Admin » button
- Enter password and click Ok
- Click on the « Feed database » tab of the Excel file

FAO RATION TOOL - english - Excel

FAO FEED DATABASE

Insert numbers only in the blue cells

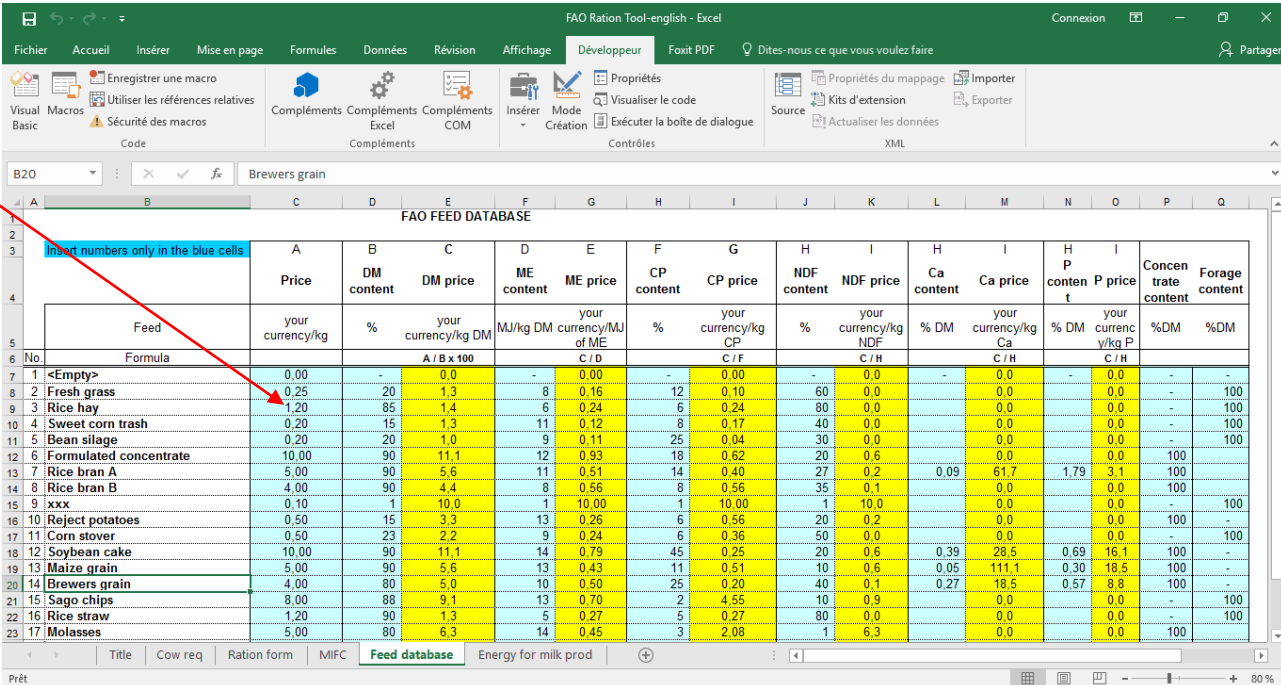
No	Feed	Price your currency/kg	DM content %	DM price your currency/kg DM	ME content MJ/kg DM	ME price your currency/MJ of ME	CP content %	CP price your currency/kg CP	NDF content %	NDF price your currency/kg NDF	Ca content % DM	Ca price your currency/kg Ca	P content % DM	P price your currency/kg P	Concen trate content %DM	Forage content %DM
1	<Empty>	0.00	-	0.0	-	0.00	-	0.00	-	0.0	-	0.0	-	0.0	-	-
2	Fresh grass	0.25	20	1.3	8	0.16	12	0.10	60	0.0	-	0.0	-	0.0	-	100
3	Rice hay	1.20	85	1.4	6	0.24	6	0.24	80	0.0	-	0.0	-	0.0	-	100
4	Sweet corn trash	0.20	15	1.3	11	0.12	8	0.17	40	0.0	-	0.0	-	0.0	-	100
5	Bean silage	0.20	20	1.0	9	0.11	25	0.04	30	0.0	-	0.0	-	0.0	-	100
6	Formulated concentrate	10.00	90	11.1	12	0.93	18	0.62	20	0.6	-	0.0	-	0.0	100	-
7	Rice bran A	5.00	90	5.6	11	0.51	14	0.40	27	0.2	0.09	61.7	1.79	3.1	100	-
8	Rice bran B	4.00	90	4.4	8	0.56	8	0.56	35	0.1	-	0.0	-	0.0	100	-
9	xxx	0.10	1	10.0	1	10.00	1	10.00	1	10.0	-	0.0	-	0.0	-	100
10	Reject potatoes	0.50	15	3.3	13	0.26	6	0.56	20	0.2	-	0.0	-	0.0	-	100
11	Corn stover	0.50	23	2.2	9	0.24	6	0.36	50	0.0	-	0.0	-	0.0	-	100
12	Soybean cake	10.00	90	11.1	14	0.79	45	0.25	20	0.6	0.39	28.5	0.69	16.1	100	-
13	Maize grain	5.00	90	5.6	13	0.43	11	0.51	10	0.6	0.05	111.1	0.30	18.5	100	-
14	Brewers grain	4.00	80	5.0	10	0.50	25	0.20	40	0.1	0.27	18.5	0.57	8.8	100	-
15	Sago chips	8.00	88	9.1	13	0.70	2	4.55	10	0.9	-	0.0	-	0.0	-	100
16	Rice straw	1.20	90	1.3	5	0.27	5	0.27	80	0.0	-	0.0	-	0.0	-	100
17	Molasses	5.00	80	6.3	14	0.45	3	2.08	1	6.3	-	0.0	-	0.0	100	-



## 2. Data input and control

### 2.1 Feed database

- You can directly modify an ingredient value (blue cells only)
- Don't directly enter values into yellow cells



The screenshot shows the 'FAO FEED DATABASE' spreadsheet. The table has columns for Feed, Price, DM content, DM price, ME content, ME price, CP content, CP price, NDF content, NDF price, Ca content, Ca price, P content, P price, Concentrate content, and Forage content. The rows list various feed ingredients like Fresh grass, Rice hay, Sweet corn trash, Bean silage, Formulated concentrate, Rice bran A, Rice bran B, xxx, Reject potatoes, Corn stover, Soybean cake, Maize grain, Brewers grain, Sago chips, Rice straw, and Molasses. The cells are color-coded: blue for input (Price, DM content, DM price, ME content, ME price, CP content, CP price, NDF content, NDF price, Ca content, Ca price, P content, P price, Concentrate content, Forage content) and yellow for calculated values (Feed, your currency/kg, %, your currency/kg DM, MJ/kg DM, your currency/MJ of ME, C/D, %, your currency/kg CP, C/F, %, your currency/kg NDF, C/H, %, your currency/kg Ca, C/H, %, your currency/kg P, C/H, %, your currency/kg DM, C/H, %, your currency/kg DM, C/H, %, your currency/kg DM, C/H, %).

Feed	Price	DM content	DM price	ME content	ME price	CP content	CP price	NDF content	NDF price	Ca content	Ca price	P content	P price	Concentrate content	Forage content
your currency/kg	%	your currency/kg DM	MJ/kg DM	your currency/MJ of ME	C/D	%	your currency/kg CP	C/F	%	your currency/kg NDF	C/H	%	your currency/kg Ca	C/H	%
<Empty>	0.00	-	0.0	-	0.00	-	0.00	-	0.0	-	0.0	-	0.0	-	-
Fresh grass	0.25	20	1.3	8	0.16	12	0.10	60	0.0	-	0.0	0.0	-	100	-
Rice hay	1.20	85	1.4	6	0.24	6	0.24	80	0.0	-	0.0	0.0	-	100	-
Sweet corn trash	0.20	15	1.3	11	0.12	8	0.17	40	0.0	-	0.0	0.0	-	100	-
Bean silage	0.20	20	1.0	9	0.11	25	0.04	30	0.0	-	0.0	0.0	-	100	-
Formulated concentrate	10.00	90	11.1	12	0.93	18	0.62	20	0.6	-	0.0	0.0	-	100	-
Rice bran A	5.00	90	5.6	11	0.51	14	0.40	27	0.2	0.09	61.7	1.79	3.1	100	-
Rice bran B	4.00	90	4.4	8	0.56	8	0.56	35	0.1	-	0.0	0.0	-	100	-
xxx	0.10	1	10.0	1	10.00	1	10.00	1	10.0	-	0.0	0.0	-	100	-
Reject potatoes	0.50	15	3.3	13	0.26	6	0.56	20	0.2	-	0.0	0.0	-	100	-
Corn stover	0.50	23	2.2	9	0.24	6	0.36	50	0.0	-	0.0	0.0	-	100	-
Soybean cake	10.00	90	11.1	14	0.79	45	0.25	20	0.6	0.39	28.5	0.69	16.1	100	-
Maize grain	5.00	90	5.6	13	0.43	11	0.51	10	0.6	0.05	111.1	0.30	18.5	100	-
Brewers grain	4.00	80	5.0	10	0.50	25	0.20	40	0.1	0.27	19.5	0.57	8.8	100	-
Sago chips	8.00	88	9.1	13	0.70	2	4.55	10	0.9	-	0.0	0.0	-	100	-
Rice straw	1.20	90	1.3	5	0.27	5	0.27	80	0.0	-	0.0	0.0	-	100	-
Molasses	5.00	80	6.3	14	0.45	3	2.08	1	6.3	-	0.0	0.0	-	100	-



## 2. Data input and control

### 2.1 Feed database

- You can directly modify an ingredient value (blue cells only)
- Don't directly enter values into yellow cells
- Fill in information on forage and concentrate composition

Example : 100 in the concentrate column and 0 in the forage column if the ingredient is composed of 100% of concentrate and 0% of forage

The screenshot shows the 'FAO FEED DATABASE' table in an Excel spreadsheet. The table has columns for various feed ingredients and their nutritional values. A red arrow points to the 'Concentrate content' column, highlighting the value 100 for 'Brewers grain'.

No	Feed	Price	DM content	DM price	ME content	ME price	CP content	CP price	NDF content	NDF price	Ca content	Ca price	H P content	P price	Concentrate content	Forage content
1	<Empty>	0.00	-	0.0	0.00	-	0.00	-	0.0	-	-	0.0	-	0.0	-	-
2	Fresh grass	0.25	20	1.3	8	0.16	12	0.10	60	0.0	-	0.0	-	0.0	-	100
3	Rice hay	1.20	85	1.4	6	0.24	6	0.24	80	0.0	-	0.0	-	0.0	-	100
4	Sweet corn trash	0.20	15	1.3	11	0.12	8	0.17	40	0.0	-	0.0	-	0.0	-	100
5	Bean silage	0.20	20	1.0	9	0.11	25	0.04	30	0.0	-	0.0	-	0.0	-	100
6	Formulated concentrate	10.00	90	11.1	12	0.93	18	0.62	20	0.6	-	0.0	-	0.0	100	-
7	Rice bran A	5.00	90	5.6	11	0.51	14	0.40	27	0.2	0.09	61.7	1.79	3.1	100	-
8	Rice bran B	4.00	90	4.4	8	0.56	8	0.56	35	0.1	-	0.0	-	0.0	100	-
9	xxx	0.10	1	10.0	1	10.00	1	10.00	1	10.0	-	0.0	-	0.0	-	100
10	Reject potatoes	0.50	15	3.3	13	0.26	6	0.56	20	0.2	-	0.0	-	0.0	100	-
11	Corn stover	0.50	23	2.2	9	0.24	6	0.36	50	0.0	-	0.0	-	0.0	-	100
12	Soybean cake	10.00	90	11.1	14	0.79	45	0.25	20	0.6	0.39	28.5	0.69	16.1	100	-
13	Maize grain	5.00	90	5.6	13	0.43	11	0.51	10	0.6	0.05	111.1	0.30	18.5	100	-
14	Brewers grain	4.00	80	5.0	10	0.50	25	0.20	40	0.1	0.27	19.5	0.57	8.8	100	-
15	Sago chips	8.00	88	9.1	13	0.70	2	4.55	10	0.9	-	0.0	-	0.0	-	100
16	Rice straw	1.20	90	1.3	5	0.27	5	0.27	80	0.0	-	0.0	-	0.0	-	100
17	Molasses	5.00	80	6.3	14	0.45	3	2.08	1	6.3	-	0.0	-	0.0	100	-



## 2. Data input and control

### 2.1 Feed database

To add a new ingredient :

- Click on the next empty cell in column A: enter the next ingredient number

4	18	Corn greenchop	0.70	25	2.8	7	0.40	7	0.40
5	19								





## 2. Data input and control

### 2.1 Feed database

To add a new ingredient :

- Click on the next empty cell in column A: enter the next ingredient number

4	18	Corn greenchop	0.70	25	2.8	7	0.40	7	0.40
5	19								

- Click on the right cell in column B and enter the name of the ingredient you want to add

23	17	Molasses	3.00	60	6.3	14	0.45	3	2.06
24	18	Corn greenchop	0.70	25	2.8	7	0.40	7	0.40
25	19	Cassava leaves							



## 2. Data input and control

### 2.1 Feed database

To add a new ingredient :

- Click on the next empty cell in column A: enter the next ingredient number

4	18	Corn greenchop	0.70	25	2.8	7	0.40	7	0.40
5	19								

- Click on the right cell in column B and enter the name of the ingredient you want to add

23	17	Molasses	3.00	60	6.3	14	0.45	3	2.06
24	18	Corn greenchop	0.70	25	2.8	7	0.40	7	0.40
25	19	cassava leaves							

- Enter its price and DM content respectively in columns C and D

3R	18	Corn greenchop	0.70	25	2.8	7	0.40	7	0.40
26	19	cassava leaves	1	12					



## 2. Data input and control

### 2.1 Feed database

The next cell is a yellow cell. A formula has to be copied. To do so, click in the cell column E but on the previous row (ingredient 18 in the example with value 2.8). Place the mouse cursor on the bottom right of the cell. The cursor shape, normally a white cross should change to a black cross. Click and hold the click, then go down to the cell in column E on the following row (row with ingredient 19 in the example). Unhold the click, the formula has been copied with the correct values.

23	17	Molasses	5,00	80	6,3	14
24	18	Corn greenchop	0,70	25	2,8	7
25	19	cassava leaves	0,70	25		

23	17	Molasses	5,00	80	6,3	14
24	18	Corn greenchop	0,70	25	2,8	7
25	19	cassava leaves	0,70	25		
26	20	unv				

23	17	Molasses	5,00	80	6,3	
24	18	Corn greenchop	0,70	25	2,8	
25	19	cassava leaves	0,70	25	2,8	
26	20	unv				



## 2. Data input and control

### 2.1 Feed database

- Repeat the same operations for yellow cells and fill blue cells with the appropriate ingredient value.
- When you've completed the entire row, click on the left row number of the previous row, to select all the previous row (24 in this example)

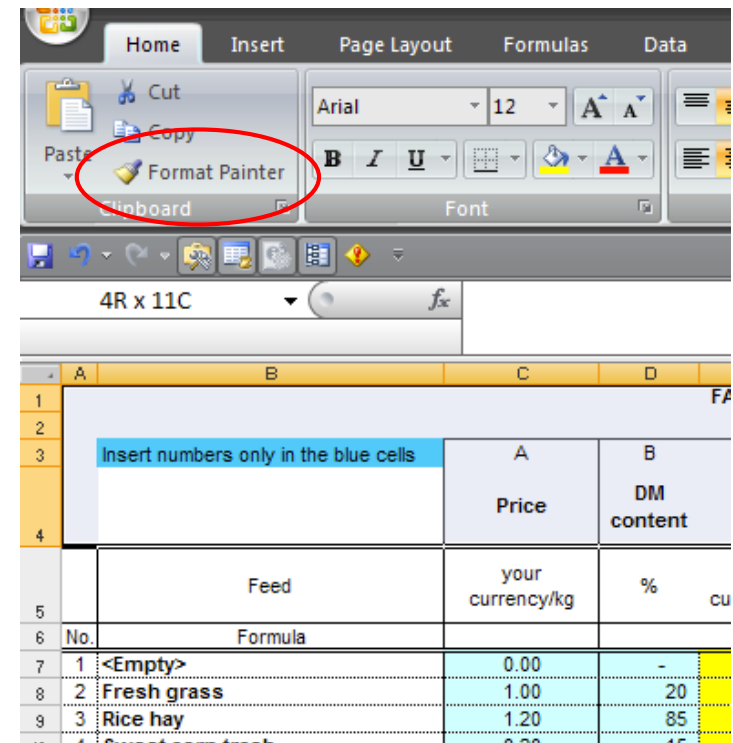
23	17	maize	0.00	0.00	0.00	14	0.40	0	2.00
24	18	Corn greenchop	0.70	25	2.8	7	0.40	7	0.40
25	19	cassava leaves		1	12				



## 2. Data input and control

### 2.1 Feed database

- Go and click on the format painter





## 2. Data input and control

### 2.1 Feed database

- Go and click on the format painter
- Click on the left row number of the row you've just completed (25 in this example), the format is now the same as previous rows.

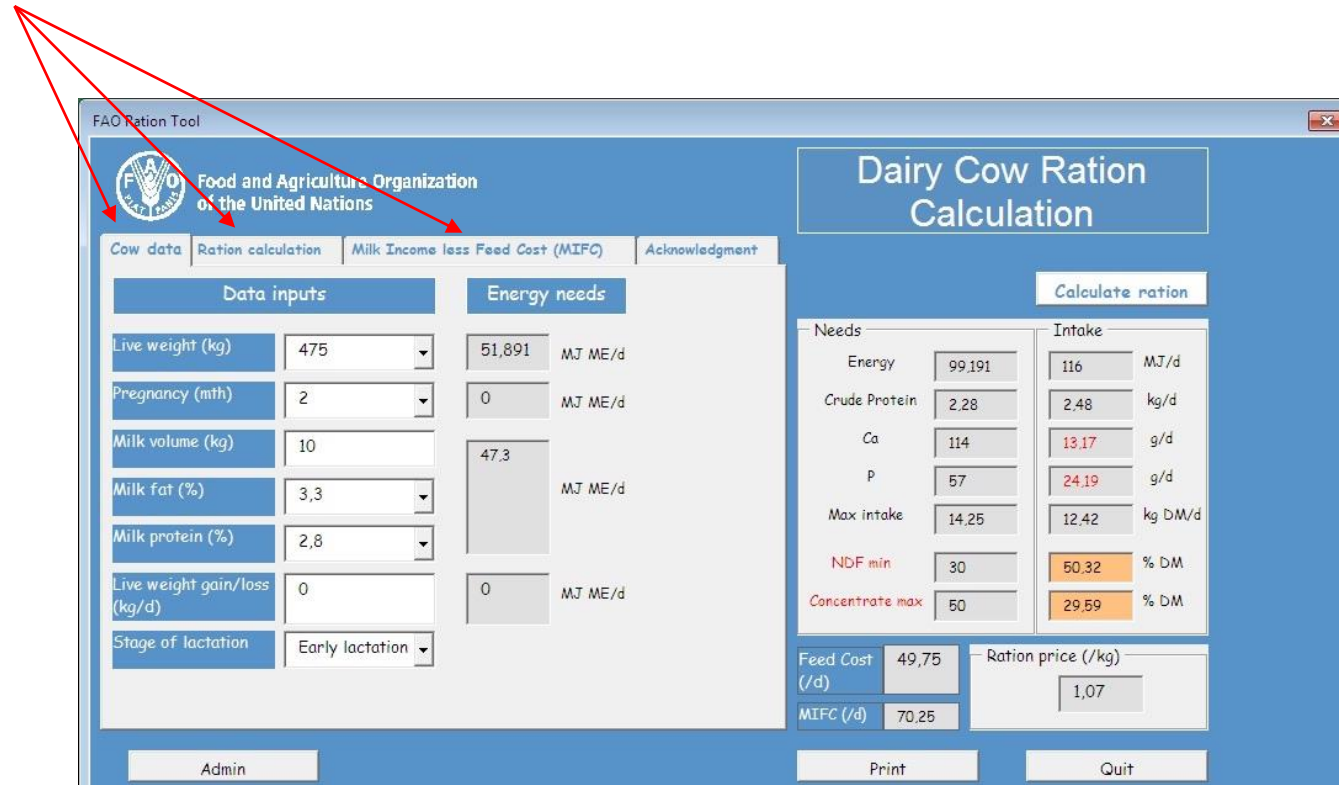
24	18	Corn greenchop	0.70	25	2.8	7	0.40	7	0.40
25	19	cassava leaves	1.00	12	8.3	7	1.19	15	0.56

- Up to 100 ingredients can be added
- To go back to user form, click on « Title » sheet and click on the « Back to user form » button

## 2. Data input and control

### 2.2 User form

You need to input data in 3 of the 4 tabs of the user form



The screenshot displays the FAO Ration Tool interface, specifically the 'Cow data' tab. The interface is divided into several sections:

- Top Bar:** Contains the FAO logo and the text 'Food and Agriculture Organization of the United Nations'.
- Navigation Tabs:** Four tabs are visible: 'Cow data', 'Ration calculation', 'Milk Income less Feed Cost (MIFC)', and 'Acknowledgment'. Red arrows point to the first three tabs, indicating that data must be input in 3 of the 4 tabs.
- Data Inputs Section:** Contains input fields for various cow parameters:
  - Live weight (kg): 475
  - Pregnancy (mth): 2
  - Milk volume (kg): 10
  - Milk fat (%): 3,3
  - Milk protein (%): 2,8
  - Live weight gain/loss (kg/d): 0
  - Stage of lactation: Early lactation
- Energy Needs Section:** Displays calculated energy needs:
  - 51,891 MJ ME/d
  - 0 MJ ME/d
  - 47,3 MJ ME/d
  - 0 MJ ME/d
- Needs and Intake Section:** Compares nutritional needs with intake:
  - Energy: 99,191 (Need) vs 116 (Intake) MJ/d
  - Crude Protein: 2,28 (Need) vs 2,48 (Intake) g/d
  - Ca: 114 (Need) vs 13,17 (Intake) g/d
  - P: 57 (Need) vs 24,19 (Intake) g/d
  - Max intake: 14,25 (Need) vs 12,42 (Intake) kg DM/d
  - NDF min: 30 (Need) vs 50,32 (Intake) % DM
  - Concentrate max: 50 (Need) vs 29,59 (Intake) % DM
- Feed Cost and MIFC Section:** Displays calculated costs:
  - Feed Cost (/d): 49,75
  - MIFC (/d): 70,25
- Ration Price Section:** Displays the calculated ration price: 1,07 (/kg).
- Buttons:** 'Admin', 'Print', and 'Quit' buttons are located at the bottom.

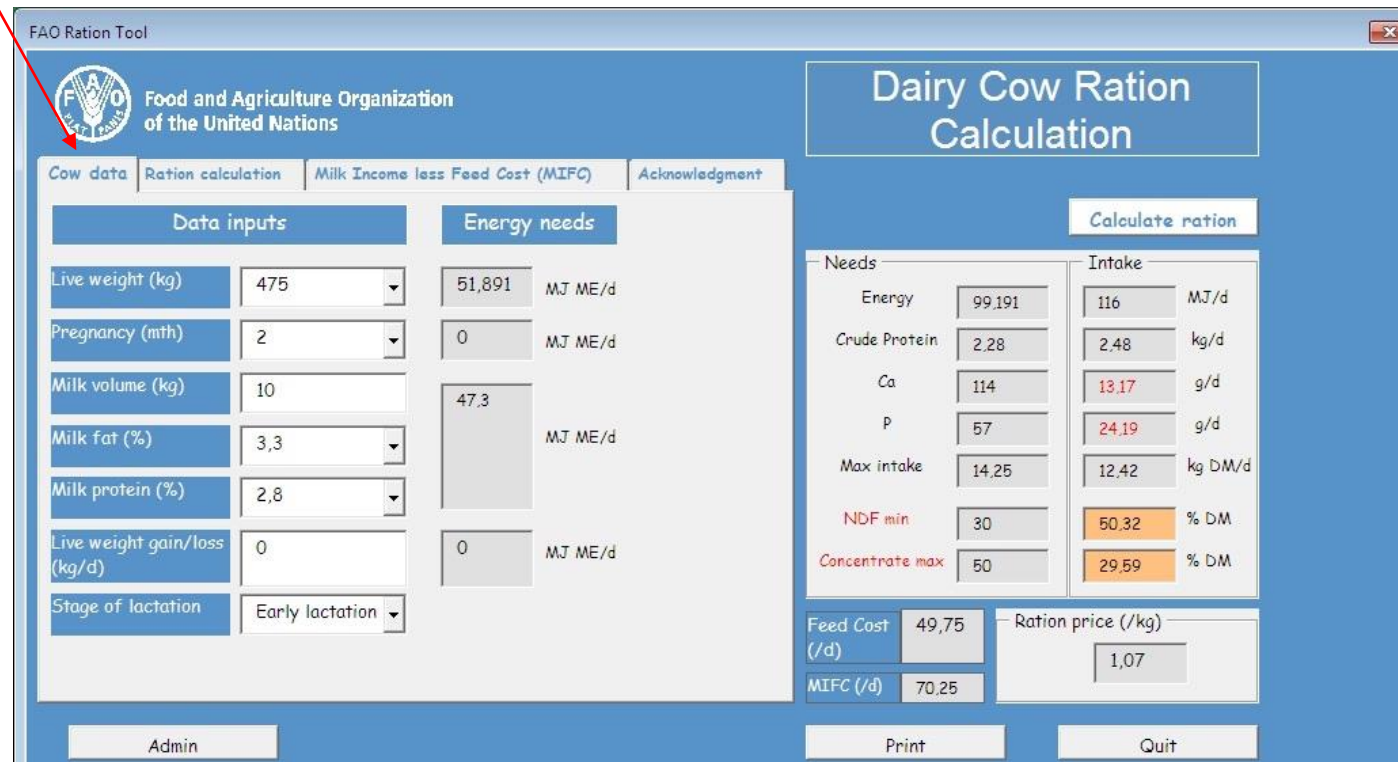


## 1<sup>st</sup> tab : Cow data

Example : input data for a **450 kg cow** that produces **9 kg of milk per day** in **early lactation stage**.

The cow is at **1 month pregnancy stage**. The milk contains **3.5% of fat** and **3.1% of protein**.

We consider the cow will neither gain nor lose weight.



FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

**Cow data** | Ration calculation | Milk Income less Feed Cost (MIFC) | Acknowledgment

**Data inputs**

Live weight (kg)	475
Pregnancy (mth)	2
Milk volume (kg)	10
Milk fat (%)	3,3
Milk protein (%)	2,8
Live weight gain/loss (kg/d)	0
Stage of lactation	Early lactation

**Energy needs**

51,891	MJ ME/d
0	MJ ME/d
47,3	MJ ME/d
0	MJ ME/d

**Dairy Cow Ration Calculation**

**Calculate ration**

Needs		Intake	
Energy	99,191	116	MJ/d
Crude Protein	2,28	2,48	kg/d
Ca	114	13,17	g/d
P	57	24,19	g/d
Max intake	14,25	12,42	kg DM/d
NDF min	30	50,32	% DM
Concentrate max	50	29,59	% DM

**Feed Cost (/d)** 49,75

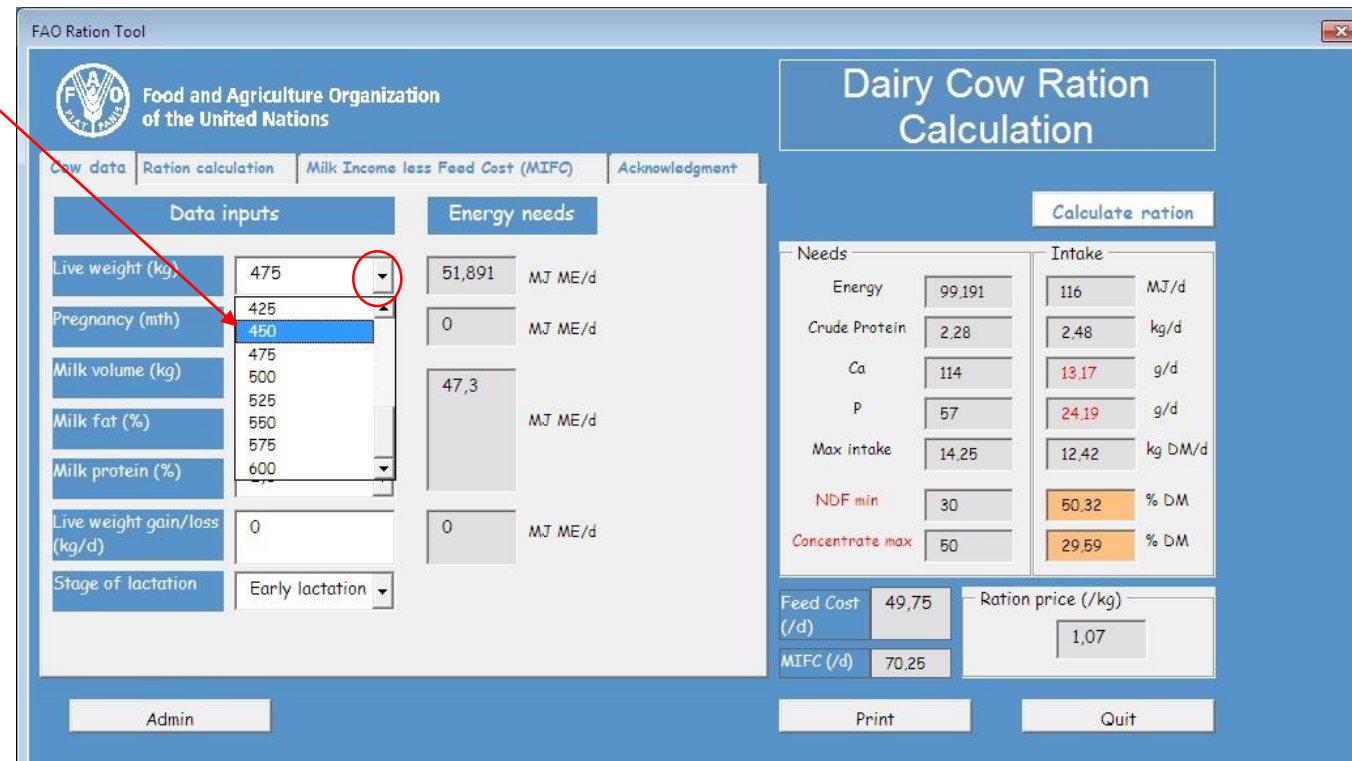
**MIFC (/d)** 70,25

**Ration price (/kg)** 1,07

Admin | Print | Quit

## 1<sup>st</sup> tab : Cow data

- Select 450 in the drop-down list for live weight



FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | Ration calculation | Milk Income less Feed Cost (MIFC) | Acknowledgment

**Data inputs**

Live weight (kg)	475
Pregnancy (mth)	425
Milk volume (kg)	475
Milk fat (%)	500
Milk protein (%)	525
Live weight gain/loss (kg/d)	550
Stage of lactation	575
	600

**Energy needs**

51,891	MJ ME/d
0	MJ ME/d
47,3	MJ ME/d
0	MJ ME/d

**Dairy Cow Ration Calculation**

Calculate ration

<b>Needs</b>		<b>Intake</b>	
Energy	99,191	116	MJ/d
Crude Protein	2,28	2,48	kg/d
Ca	114	13,17	g/d
P	57	24,19	g/d
Max intake	14,25	12,42	kg DM/d
NDF min	30	50,32	% DM
Concentrate max	50	29,59	% DM

Feed Cost (/d) 49,75

MIFC (/d) 70,25

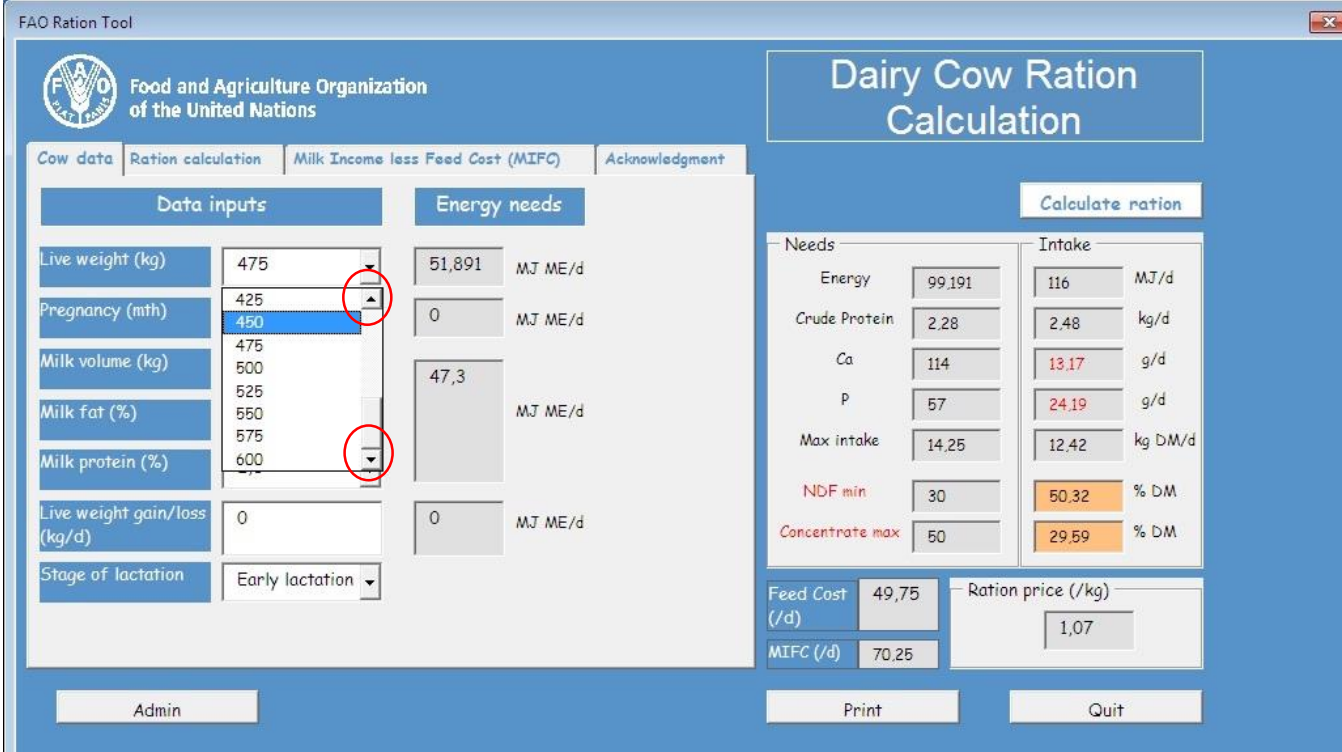
Ration price (/kg) 1,07

Admin | Print | Quit

1<sup>st</sup> tab : Cow data

- Select 450 in the drop-down list for live weight

*You can use the up and down arrow of the drop-down list to select the value*



FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | Ration calculation | Milk Income less Feed Cost (MIFC) | Acknowledgment

**Data inputs**

Live weight (kg)	475
Pregnancy (mth)	425
Milk volume (kg)	475
Milk fat (%)	500
Milk protein (%)	525
Live weight gain/loss (kg/d)	0
Stage of lactation	Early lactation

**Energy needs**

51,891	MJ ME/d
0	MJ ME/d
47,3	MJ ME/d
0	MJ ME/d

**Dairy Cow Ration Calculation**

Calculate ration

Needs		Intake	
Energy	99,191	116	MJ/d
Crude Protein	2,28	2,48	kg/d
Ca	114	13,17	g/d
P	57	24,19	g/d
Max intake	14,25	12,42	kg DM/d
NDF min	30	50,32	% DM
Concentrate max	50	29,59	% DM

Feed Cost (/d) 49,75

MIFC (/d) 70,25

Ration price (/kg) 1,07

Admin | Print | Quit



## 1<sup>st</sup> tab : Cow data

- Select 450 in the drop-down list for live weight
- Select the pregnancy stage with the drop-down list

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

**Dairy Cow Ration Calculation**

Calculate ration

Data inputs		Energy needs	
Live weight (kg)	450	51,891	MJ ME/d
Pregnancy (min)	2	0	MJ ME/d
Milk volume (kg)	1	47,3	MJ ME/d
Milk fat (%)			
Milk protein (%)			
Live weight gain/loss (kg/d)		0	MJ ME/d
Stage of lactation	Early lactation		

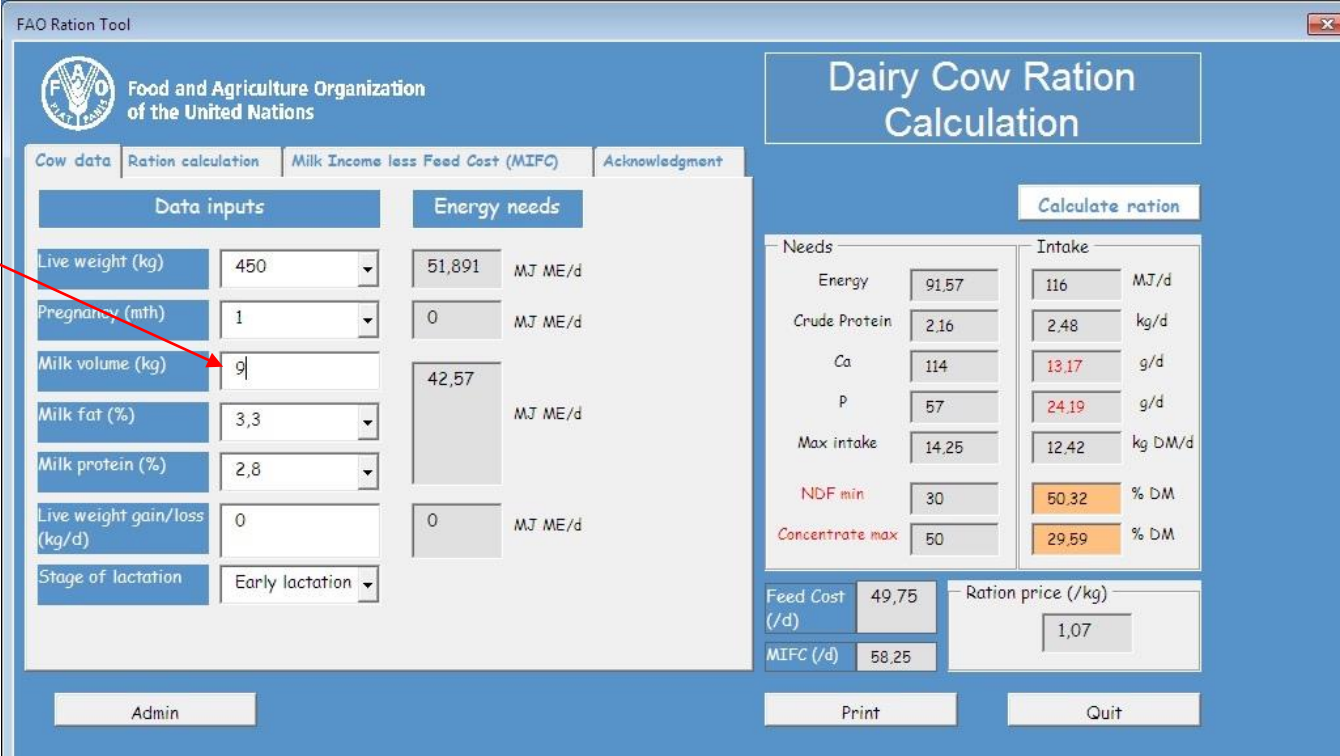
Needs		Intake	
Energy	96,3	116	MJ/d
Crude Protein	2,16	2,48	kg/d
Ca	114	13,17	g/d
P	57	24,19	g/d
Max intake	14,25	12,42	kg DM/d
NDF min	30	50,32	% DM
Concentrate max	50	29,59	% DM

Feed Cost (/d)		Ration price (/kg)	
Feed Cost (/d)	49,75	Ration price (/kg)	1,07
MIFC (/d)	70,25		

Admin Print Quit

## 1<sup>st</sup> tab : Cow data

- Select 450 in the drop-down list for live weight
- Select the pregnancy stage with the drop-down list
- Manually enter the milk production of the dairy cow (in kg per day)



FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | Ration calculation | Milk Income less Feed Cost (MIFC) | Acknowledgment

**Data inputs**

Live weight (kg)	450
Pregnancy (mth)	1
Milk volume (kg)	9
Milk fat (%)	3,3
Milk protein (%)	2,8
Live weight gain/loss (kg/d)	0
Stage of lactation	Early lactation

**Energy needs**

51,891	MJ ME/d
0	MJ ME/d
42,57	MJ ME/d
0	MJ ME/d

**Dairy Cow Ration Calculation**

Calculate ration

Needs		Intake	
Energy	91,57	116	MJ/d
Crude Protein	2,16	2,48	kg/d
Ca	114	13,17	g/d
P	57	24,19	g/d
Max intake	14,25	12,42	kg DM/d
NDF min	30	50,32	% DM
Concentrate max	50	29,59	% DM

Feed Cost (/d) 49,75      Ration price (/kg) 1,07

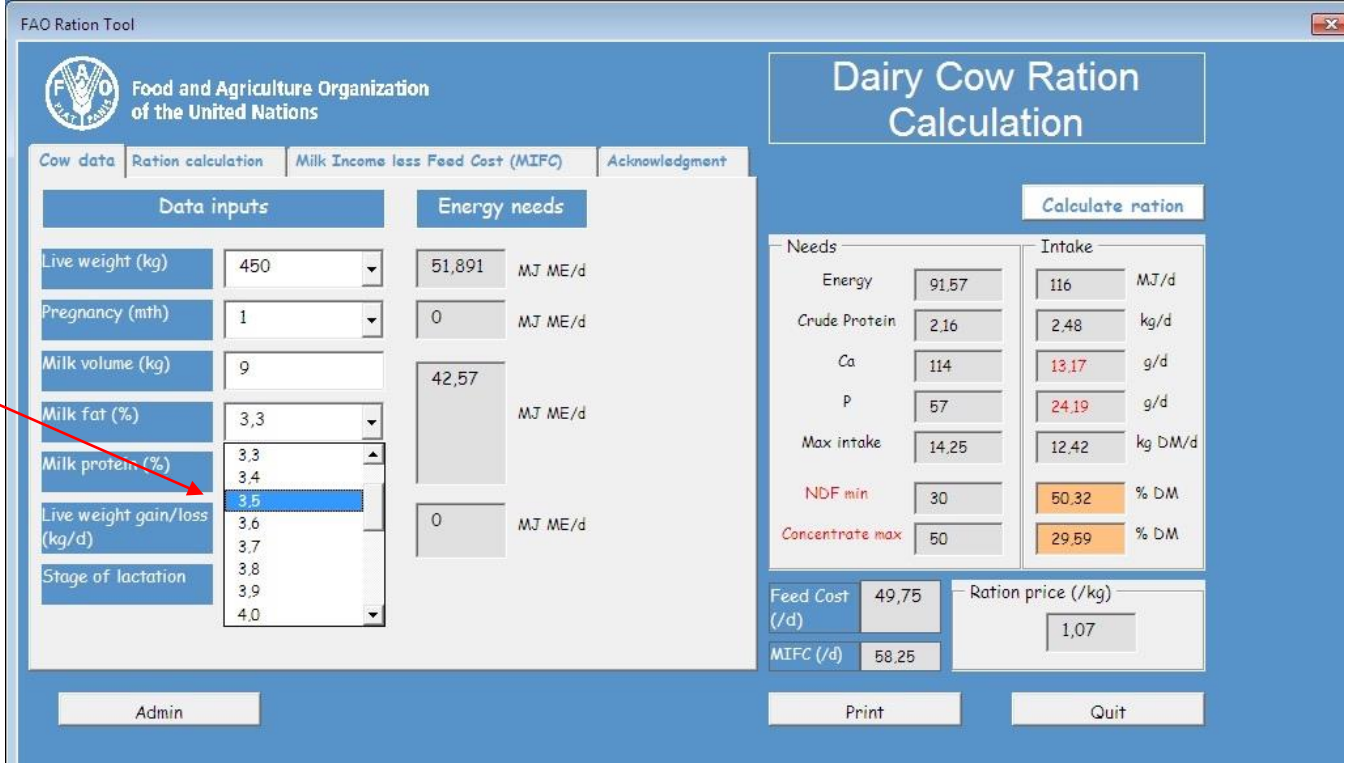
MIFC (/d) 58,25

Admin      Print      Quit



## 1<sup>st</sup> tab : Cow data

- Select 450 in the drop-down list for live weight
- Select the pregnancy stage with the drop-down list
- Manually enter the milk production of the dairy cow (in kg per day)
- Select the milk fat content in the drop-down list



FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | Ration calculation | Milk Income less Feed Cost (MIFC) | Acknowledgment

**Data inputs**

Live weight (kg)	450
Pregnancy (mth)	1
Milk volume (kg)	9
Milk fat (%)	3,3
Milk protein (%)	3,3
Live weight gain/loss (kg/d)	3,5
Stage of lactation	3,6

**Energy needs**

51,891	MJ ME/d
0	MJ ME/d
42,57	MJ ME/d
0	MJ ME/d

**Dairy Cow Ration Calculation**

Calculate ration

Needs		Intake	
Energy	91,57	116	MJ/d
Crude Protein	2,16	2,48	kg/d
Ca	114	13,17	g/d
P	57	24,19	g/d
Max intake	14,25	12,42	kg DM/d
NDF min	30	50,32	% DM
Concentrate max	50	29,59	% DM

Feed Cost (/d) 49,75

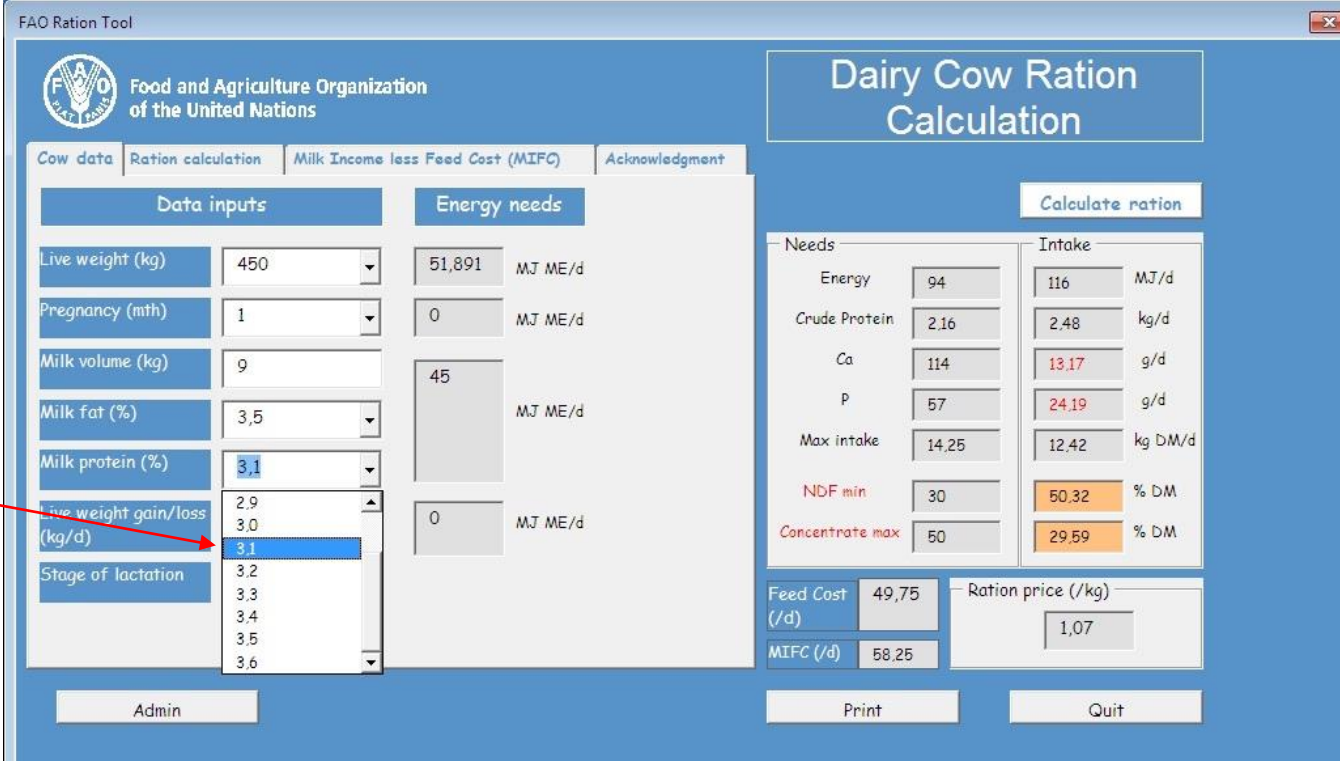
MIFC (/d) 58,25

Ration price (/kg) 1,07

Admin | Print | Quit

## 1<sup>st</sup> tab : Cow data

- Select 450 in the drop-down list for live weight
- Select the pregnancy stage with the drop-down list
- Manually enter the milk production of the dairy cow (in kg per day)
- Select the milk fat content in the drop-down list
- Select the milk protein content in the drop-down list



FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

**Dairy Cow Ration Calculation**

Calculate ration

Data inputs		Energy needs	
Live weight (kg)	450	51,891	MJ ME/d
Pregnancy (mth)	1	0	MJ ME/d
Milk volume (kg)	9	45	MJ ME/d
Milk fat (%)	3,5		
Milk protein (%)	3,1		
Live weight gain/loss (kg/d)	2,9	0	MJ ME/d
Stage of lactation	3,0		
	3,1		
	3,2		
	3,3		
	3,4		
	3,5		
	3,6		

Needs		Intake	
Energy	94	116	MJ/d
Crude Protein	2,16	2,48	kg/d
Ca	114	13,17	g/d
P	57	24,19	g/d
Max intake	14,25	12,42	kg DM/d
NDF min	30	50,32	% DM
Concentrate max	50	29,59	% DM

Feed Cost (/d) 49,75

MIFC (/d) 58,25

Ration price (/kg) 1,07

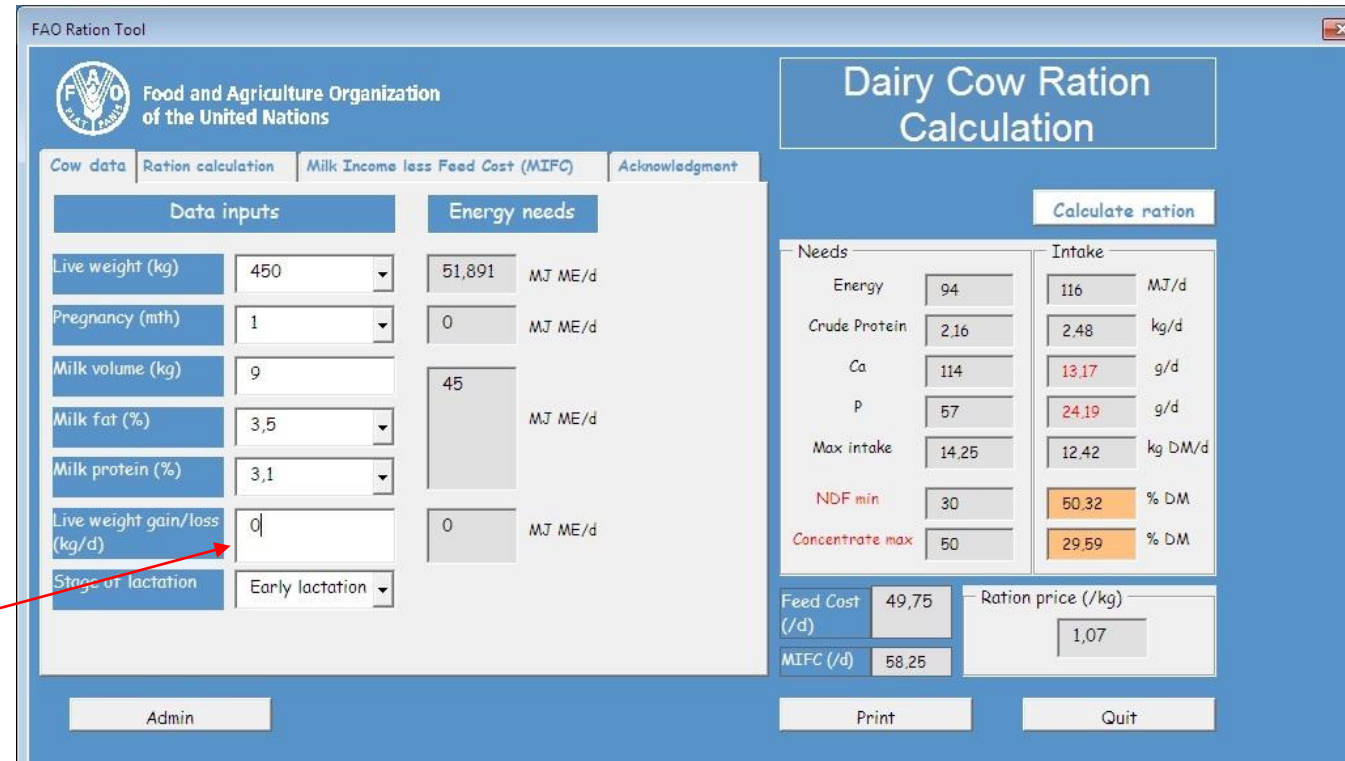
Admin Print Quit



## 1<sup>st</sup> tab : Cow data

- Select 450 in the drop-down list for live weight
- Select the pregnancy stage with the drop-down list
- Manually enter the milk production of the dairy cow (in kg per day)
- Select the milk fat content in the drop-down list
- Select the milk protein content in the drop-down list
- Manually enter the live weight gain or loss you target. 0 in our example.

You would enter -0.1 for a loss of 100g per day or 0.2 for a gain of 200g per day.



FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

**Dairy Cow Ration Calculation**

Calculate ration

Data inputs		Energy needs	
Live weight (kg)	450	51,891	MJ ME/d
Pregnancy (mth)	1	0	MJ ME/d
Milk volume (kg)	9	45	MJ ME/d
Milk fat (%)	3,5		
Milk protein (%)	3,1		
Live weight gain/loss (kg/d)	0	0	MJ ME/d
Stage of lactation	Early lactation		

Needs		Intake	
Energy	94	116	MJ/d
Crude Protein	2,16	2,48	kg/d
Ca	114	13,17	g/d
P	57	24,19	g/d
Max intake	14,25	12,42	kg DM/d
NDF min	30	50,32	% DM
Concentrate max	50	29,59	% DM

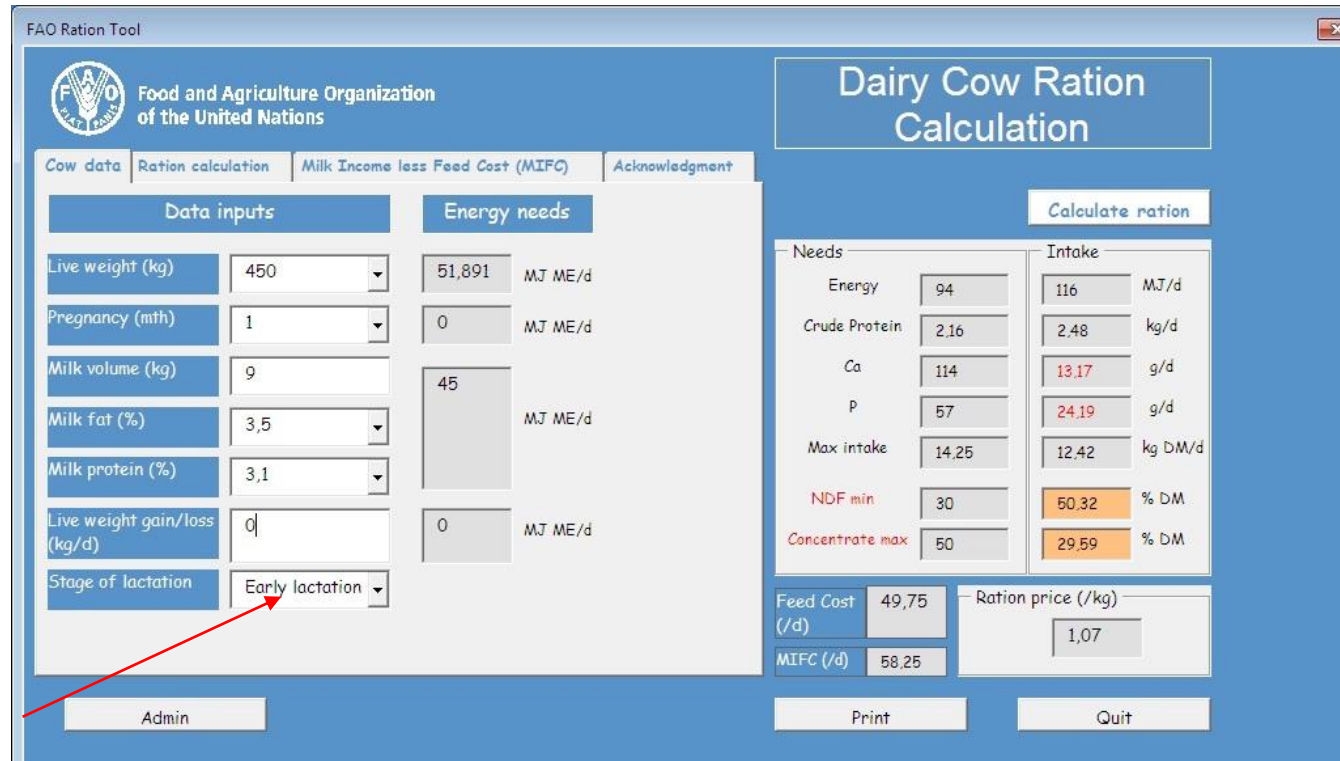
Feed Cost (/d) 49,75      Ration price (/kg) 1,07

MIFC (/d) 58,25

Admin      Print      Quit

## 1<sup>st</sup> tab : Cow data

- Select 450 in the drop-down list for live weight
- Select the pregnancy stage with the drop-down list
- Manually enter the milk production of the dairy cow (in kg per day)
- Select the milk fat content in the drop-down list
- Select the milk protein content in the drop-down list
- Manually enter the live weight gain or loss you target. 0 in our example.
- Select the stage of lactation of the dairy cow in the drop-down list



FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

**Dairy Cow Ration Calculation**

Calculate ration

Data inputs		Energy needs	
Live weight (kg)	450	51,891	MJ ME/d
Pregnancy (mth)	1	0	MJ ME/d
Milk volume (kg)	9	45	MJ ME/d
Milk fat (%)	3,5		
Milk protein (%)	3,1		
Live weight gain/loss (kg/d)	0	0	MJ ME/d
Stage of lactation	Early lactation		

Needs		Intake	
Energy	94	116	MJ/d
Crude Protein	2,16	2,48	kg/d
Ca	114	13,17	g/d
P	57	24,19	g/d
Max intake	14,25	12,42	kg DM/d
NDF min	30	50,32	% DM
Concentrate max	50	29,59	% DM

Feed Cost (/d) 49,75      Ration price (/kg) 1,07

MIFC (/d) 58,25

Admin      Print      Quit

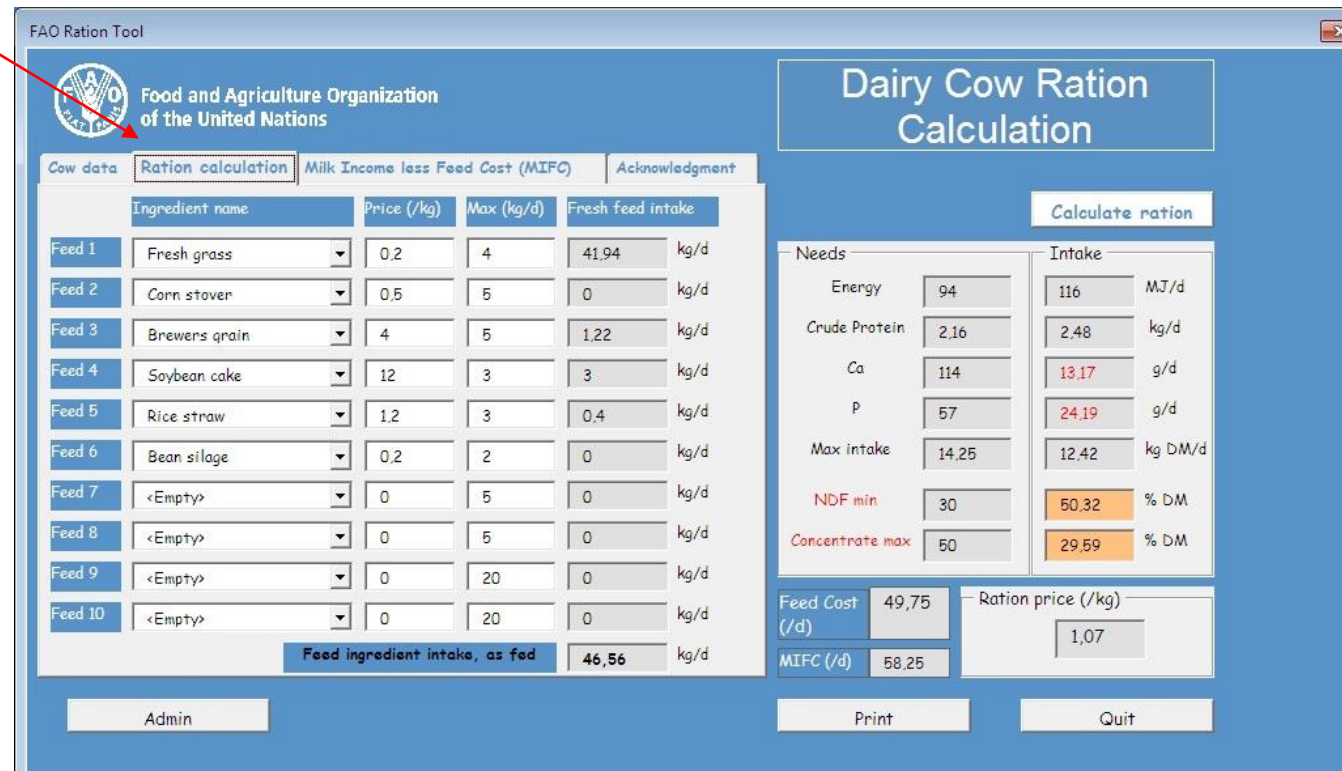
### 2<sup>nd</sup> tab : Ration calculation

- Click on the 2<sup>nd</sup> tab on the top of the window

Available ingredients the farmer has are:

1. Fresh grass (price 0.25/kg, unlimited)
2. Rice bran A (price 5/kg, 8 kg max available per day)
3. Soybean cake (price 500/ 50 kg bag , farmer receive one bag every 10 days)

Farmer has 2 cows.



FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | **Ration calculation** | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0.2	4	41.94	kg/d
Feed 2	Corn stover	0.5	5	0	kg/d
Feed 3	Brewers grain	4	5	1.22	kg/d
Feed 4	Soybean cake	12	3	3	kg/d
Feed 5	Rice straw	1.2	3	0.4	kg/d
Feed 6	Bean silage	0.2	2	0	kg/d
Feed 7	<Empty>	0	5	0	kg/d
Feed 8	<Empty>	0	5	0	kg/d
Feed 9	<Empty>	0	20	0	kg/d
Feed 10	<Empty>	0	20	0	kg/d
				<b>Feed ingredient intake, as fed</b>	<b>46.56</b> kg/d

Admin

### Dairy Cow Ration Calculation

Calculate ration

Needs		Intake	
Energy	94	116	MJ/d
Crude Protein	2.16	2.48	kg/d
Ca	114	13.17	g/d
P	57	24.19	g/d
Max intake	14.25	12.42	kg DM/d
NDF min	30	50.32	% DM
Concentrate max	50	29.59	% DM

Feed Cost (/d)	49.75	Ration price (/kg)	1.07
MIFC (/d)	58.25		

Print Quit



### 2<sup>nd</sup> tab : Ration calculation

- Click on the 2<sup>nd</sup> tab on the top of the window

Available ingredients the farmer has are:

1. Fresh grass (price 0.25/kg, unlimited)
2. Rice bran A (price 5/kg, 8 kg max available per day)
3. Soybean cake (price 500/ 50 kg bag , farmer receive one bag every 10 days)

Farmer has 2 cows.

Prices are set per kg as fed basis, not on DM. No specific currency is used to allow user to use the currency of his choice.

FAO Ration Tool

Food and Agriculture Organization of the United Nations

Cow data | **Ration calculation** | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake
Feed 1	Fresh grass	0.2	4	41.94 kg/d
Feed 2	Corn stover	0.5	5	0 kg/d
Feed 3	Brewers grain	4	5	1.22 kg/d
Feed 4	Soybean cake	12	3	3 kg/d
Feed 5	Rice straw	1.2	3	0.4 kg/d
Feed 6	Bean silage	0.2	2	0 kg/d
Feed 7	<Empty>	0	5	0 kg/d
Feed 8	<Empty>	0	5	0 kg/d
Feed 9	<Empty>	0	20	0 kg/d
Feed 10	<Empty>	0	20	0 kg/d
Feed ingredient intake, as fed				46.56 kg/d

**Dairy Cow Ration Calculation**

Calculate ration

Needs	Intake	
Energy	94	116 MJ/d
Crude Protein	2.16	2.48 kg/d
Ca	114	13.17 g/d
P	57	24.19 g/d
Max intake	14.25	12.42 kg DM/d
NDF min	30	50.32 % DM
Concentrate max	50	29.59 % DM

Feed Cost (/d) 49,75

MIFC (/d) 58,25

Ration price (/kg) 1,07

Admin Print Quit



## 2<sup>nd</sup> tab : Ration calculation

- Click on the 2<sup>nd</sup> tab on the top of the window

Available ingredients the farmer has are:

1. Fresh grass (price 0.25/kg, unlimited)
2. Rice bran A (price 5/kg, 8 kg max available per day)
3. Soybean cake (price 500/ 50 kg bag , farmer receive one bag every 10 days)

Farmer has 2 cows.

*1st ingredient :*

*Price is already per kg (as fed basis), quantities are unlimited so we will enter the price directly and put 99 for quantity available per day per cow.*



## 2<sup>nd</sup> tab : Ration calculation

- Click on the 2<sup>nd</sup> tab on the top of the window

Available ingredients the farmer has are:

1. Fresh grass (price 0.25/kg, unlimited)
2. Rice bran A (price 5/kg, 8 kg max available per day)
3. Soybean cake (price 500/ 50kg bag , farmer receive one bag every 10 days)

*2nd ingredient :*

*Price is already per kg, quantities are limited to 8 kg per day.*

*We will enter the price directly.*

*We have to calculate the quantity available per day per cow which is 8 kg per day / 2 cows = **4 kg / day /cow***





## 2<sup>nd</sup> tab : Ration calculation

- Click on the 2<sup>nd</sup> tab on the top of the window

Available ingredients the farmer has are:

1. Fresh grass (price 0.25/kg, unlimited)
2. Rice bran A (price 5/kg, 8 kg max available per day)
3. Soybean cake (price 500/ 50kg bag , farmer receive one bag every 10 days)

## *3rd ingredient :*

*Price is set per bag, not per kg,  
quantities are limited due to the  
purchase of one bag every 10 days.  
Price will be :  $500 / 50 = 10 / \text{kg}$  (as  
fed basis)*

*Quantity available per day per cow  
will be  $50 \text{ kg} / 10 \text{ days} / 2 \text{ cows}$   
 **$= 2.5 \text{ kg} / \text{day} / \text{cow}$***





### 2<sup>nd</sup> tab : Ration calculation

- Click on the 2<sup>nd</sup> tab on the top of the window
- The 1<sup>st</sup> ingredient, for example « Fresh grass » you need is already available on the « Feed 1 » row, you do not need to change anything.

Please note at this stage that « Soybean cake » is selected on row 4

FAO Ration Tool

Food and Agriculture Organization of the United Nations

Cow data | **Ration calculation** | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake
Feed 1	Fresh grass	0.2	4	41.94 kg/d
Feed 2	Corn stover	0.5	5	0 kg/d
Feed 3	Brewers grain	4	5	1.22 kg/d
Feed 4	Soybean cake	12	3	3 kg/d
Feed 5	Rice straw	1.2	3	0.4 kg/d
Feed 6	Bean silage	0.2	2	0 kg/d
Feed 7	<Empty>	0	5	0 kg/d
Feed 8	<Empty>	0	5	0 kg/d
Feed 9	<Empty>	0	20	0 kg/d
Feed 10	<Empty>	0	20	0 kg/d
Feed ingredient intake, as fed				46.56 kg/d

**Dairy Cow Ration Calculation**

Calculate ration

Needs	Intake
Energy 94	116 MJ/d
Crude Protein 2.16	2.48 kg/d
Ca 114	13.17 g/d
P 57	24.19 g/d
Max intake 14.25	12.42 kg DM/d
NDF min 30	50.32 % DM
Concentrate max 50	29.59 % DM

Feed Cost (/d) 49.75

MIFC (/d) 58.25

Ration price (/kg) 1.07

Admin | Print | Quit



### 2<sup>nd</sup> tab : Ration calculation

- Click on the 2<sup>nd</sup> tab on the top of the window
- The 1<sup>st</sup> ingredient, for example « Fresh grass » you need is already available on the « Feed 1 » row, you do not need to change anything.
- 2<sup>nd</sup> ingredient « Rice bran A » needs to be added. Click on the arrow of the 2<sup>nd</sup> feed to display the list and select your ingredient (use the top and bottom arrow on the right side of the drop-down list to select the ingredient you need).

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Tab: Ration calculation

Feed	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake
Feed 1	Fresh grass	0.2	4	41.94 kg/d
Feed 2	Corn stover	0.5	5	0 kg/d
Feed 3	Formulated concentrate	4	5	1.22 kg/d
Feed 4	Rice bran A	12	3	3 kg/d
Feed 5	Rice bran B	1.2	3	0.4 kg/d
Feed 6	Reject potatoes	1.2	3	0.4 kg/d
Feed 7	Corn stover	0.2	2	0 kg/d
Feed 8	Soybean cake	0.2	2	0 kg/d
Feed 9	Maize grain	0	5	0 kg/d
Feed 10	<Empty>	0	5	0 kg/d

Feed ingredient intake, as fed: 46.56 kg/d

### Dairy Cow Ration Calculation

Calculate ration

Needs	Intake	
Energy	94	116 MJ/d
Crude Protein	2.16	2.48 kg/d
Ca	114	13.17 g/d
P	57	24.19 g/d
Max intake	14.25	12.42 kg DM/d
NDF min	30	50.32 % DM
Concentrate max	50	29.59 % DM

Feed Cost (/d): 49.75

MIFC (/d): 58.25

Ration price (/kg): 1.07

Buttons: Admin, Print, Quit



### 2<sup>nd</sup> tab : Ration calculation

- Click on the 2<sup>nd</sup> tab on the top of the window
- The 1<sup>st</sup> ingredient, for example « Fresh grass » you need is already available on the « Feed 1 » row, you do not need to change anything.
- 2<sup>nd</sup> ingredient « Rice bran A » needs to be added. Click on the arrow of the 2<sup>nd</sup> feed to display the list and select your ingredient
- Select the 3<sup>rd</sup> ingredient « Soybean cake » in the list on « Feed 3 » row. You'll get an error message as the feed is already selected on row 4. Click on the « Ok » button or close the window, and select « <Empty> » as ingredient for Feed 4.

FAO Ration Tool

Food and Agriculture Organization of the United Nations

Dairy Cow Ration Calculation

Calculate ration

Feed	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake
Feed 1	Fresh grass	0.2	4	41.94 kg/d
Feed 2	Rice bran A	5	5	0 kg/d
Feed 3	Soybean cake	12	5	1.22 kg/d
Feed 4	Rice bran A	12	3	3 kg/d
Feed 5	xxx	1.2	3	0.4 kg/d
Feed 6	Reject potatoes	0.2	0	0 kg/d
Feed 7	Corn stover	0	0	0 kg/d
Feed 8	Soybean cake	0	0	0 kg/d
Feed 9	<Empty>	0	0	0 kg/d
Feed 10	<Empty>	0	0	0 kg/d

Warning: This ingredient has already been selected : Soybean cake

Acceptar

Needs

Parameter	Value
Energy	94
Crude Protein	2.16
Ca	114
P	57

Intake

Parameter	Value
Energy	122 MJ/d
Crude Protein	2.73 kg/d
Ca	14.81 g/d
P	26.21 g/d
DM	12.55 kg DM/d
DM	48.46 % DM
DM	30.27 % DM

Ration price (/kg)

1.28

Feed ingredient intake, as fed

46.56 kg/d

MIFC (/d)

48.49

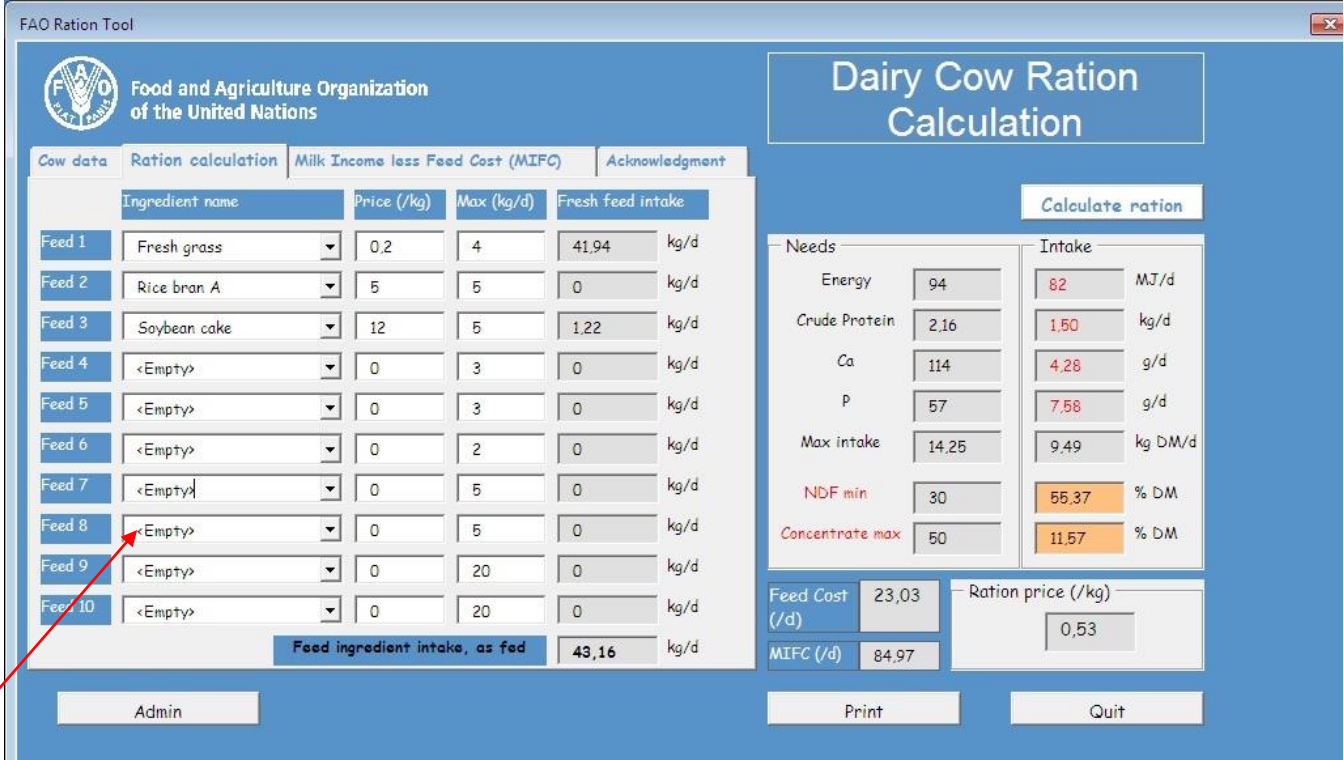
Admin

Print

Quit

### 2<sup>nd</sup> tab : Ration calculation

- Click on the 2<sup>nd</sup> tab on the top of the window
- The 1<sup>st</sup> ingredient, for example « Fresh grass » you need is already available on the « Feed 1 » row, you do not need to change anything.
- 2<sup>nd</sup> ingredient « Rice bran A » needs to be added. Click on the arrow of the 2<sup>nd</sup> feed to display the list and select your ingredient
- Select the 3<sup>rd</sup> ingredient « Formulated concentrate » in the list on « Feed 3 » row. You'll get an error message as the feed is already selected on row 7.



FAO Ration Tool

Food and Agriculture Organization of the United Nations

Tab: Cow data | **Ration calculation** | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0.2	4	41.94	kg/d
Feed 2	Rice bran A	5	5	0	kg/d
Feed 3	Soybean cake	12	5	1.22	kg/d
Feed 4	<Empty>	0	3	0	kg/d
Feed 5	<Empty>	0	3	0	kg/d
Feed 6	<Empty>	0	2	0	kg/d
Feed 7	<Empty>	0	5	0	kg/d
Feed 8	<Empty>	0	5	0	kg/d
Feed 9	<Empty>	0	20	0	kg/d
Feed 10	<Empty>	0	20	0	kg/d
<b>Feed ingredient intake, as fed</b>				<b>43.16</b>	<b>kg/d</b>

Buttons: Admin

### Dairy Cow Ration Calculation

Calculate ration

Needs		Intake	
Energy	94	82	MJ/d
Crude Protein	2.16	1.50	kg/d
Ca	114	4.28	g/d
P	57	7.58	g/d
Max intake	14.25	9.49	kg DM/d
NDF min	30	55.37	% DM
Concentrate max	50	11.57	% DM

Feed Cost (/d): 23.03      MIFC (/d): 84.97      Ration price (/kg): 0.53

Buttons: Print, Quit

- Once you have selected all ingredients, for the rest of the tabs, select <Empty>.
- In this case we are formulating ration with 3 ingredients and hence the rest would be < Empty>





## 2<sup>nd</sup> tab : Ration calculation

Up to 10 ingredients can be selected  
for ration formulation.

Prices are picked up from database  
automatically but might need to be  
manually changed like in our example.

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | **Ration calculation** | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0.2	4	41.94	kg/d
Feed 2	Rice bran A	5	5	0	kg/d
Feed 3	Soybean cake	12	5	1.22	kg/d
Feed 4	<Empty>	0	3	0	kg/d
Feed 5	<Empty>	0	3	0	kg/d
Feed 6	<Empty>	0	2	0	kg/d
Feed 7	<Empty>	0	5	0	kg/d
Feed 8	<Empty>	0	5	0	kg/d
Feed 9	<Empty>	0	20	0	kg/d
Feed 10	<Empty>	0	20	0	kg/d
Feed ingredient intake, as fed				43.16	kg/d

Admin

### Dairy Cow Ration Calculation

Calculate ration

Needs		Intake	
Energy	94	82	MJ/d
Crude Protein	2.16	1.50	kg/d
Ca	114	4.28	g/d
P	57	7.58	g/d
Max intake	14.25	9.49	kg DM/d
NDF min	30	55.37	% DM
Concentrate max	50	11.57	% DM

Feed Cost (/d)	23.03	Ration price (/kg)	0.53
MIFC (/d)	84.97		

Print Quit



## 2<sup>nd</sup> tab : Ration calculation

- Manually enter the price (per kg) of the first ingredient: 0.25/kg in our example.

### Reminder :

Prices are set per kg, in the currency of your choice, which is the reason why currency is not specified here. Be careful to always enter all prices in the same currency, and per kg !

FAO Ration Tool

Food and Agriculture Organization of the United Nations

Tab: Cow data | **Ration calculation** | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake
Feed 1	Fresh grass	0.25	4	41.94 kg/d
Feed 2	Rice bran A	5	5	0 kg/d
Feed 3	Soybean cake	12	5	1.22 kg/d
Feed 4	<Empty>	0	3	0 kg/d
Feed 5	<Empty>	0	3	0 kg/d
Feed 6	<Empty>	0	2	0 kg/d
Feed 7	<Empty>	0	5	0 kg/d
Feed 8	<Empty>	0	5	0 kg/d
Feed 9	<Empty>	0	20	0 kg/d
Feed 10	<Empty>	0	20	0 kg/d
Feed ingredient intake, as fed				43.16 kg/d

Enter maximum quantity of ingredient available by farmer (kg/d/cow)

### Dairy Cow Ration Calculation

Calculate ration

Needs		Intake	
Energy	94	82	MJ/d
Crude Protein	2.16	1.50	kg/d
Ca	114	4.28	g/d
P	57	7.58	g/d
Max intake	14.25	9.49	kg DM/d
NDF min	30	55.37	% DM
Concentrate max	50	11.57	% DM

Feed Cost (/d) 25.13  
MIFC (/d) 82.88

Ration price (/kg) 0.58

Admin Print Quit



## 2<sup>nd</sup> tab : Ration calculation

- Manually enter the price (per kg) of the first ingredient : 0.25/kg in our example.
- Manually enter the maximum quantity available per day per cow. In our example, we said this was not a limiting factor as we consider fresh grass an unlimited resource. In that case, you can simply enter 99 as maximum value, which is a very high and non limiting value.

The screenshot displays the 'FAO Ration Tool' interface, specifically the 'Ration calculation' tab. The interface is divided into several sections:

- Top Bar:** Contains the FAO logo and the text 'Food and Agriculture Organization of the United Nations'. Below this are four tabs: 'Cow data', 'Ration calculation' (selected), 'Milk Income less Feed Cost (MIFC)', and 'Acknowledgment'.
- Ingredient List Table:** A table with columns: 'Ingredient name', 'Price (/kg)', 'Max (kg/d)', and 'Fresh feed intake'.

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake
Feed 1	Fresh grass	0.25	99	41.94 kg/d
Feed 2	Rice bran A	5	5	0 kg/d
Feed 3	Soybean cake	12	5	1.22 kg/d
Feed 4	<Empty>	0	3	0 kg/d
Feed 5	<Empty>	0	3	0 kg/d
Feed 6	<Empty>	0	2	0 kg/d
Feed 7	<Empty>	0	5	0 kg/d
Feed 8	<Empty>	0	5	0 kg/d
Feed 9	<Empty>	0	20	0 kg/d
Feed 10	<Empty>	0	20	0 kg/d
<b>Feed ingredient intake, as fed</b>				<b>43,16 kg/d</b>
- Needs and Intake Section:** A table comparing nutritional needs with current intake.

	Needs	Intake	Unit
Energy	94	82	MJ/d
Crude Protein	2.16	1.50	kg/d
Ca	114	4.28	g/d
P	57	7.58	g/d
Max intake	14.25	9.49	kg DM/d
NDF min	30	55.37	% DM
Concentrate max	50	11.57	% DM
- Cost and Price Summary:**

Feed Cost (/d)	25,13	Ration price (/kg)	0,58
MIFC (/d)	82,88		
- Buttons:** 'Admin', 'Print', and 'Quit' buttons are located at the bottom.





## 2<sup>nd</sup> tab : Ration calculation

- Manually enter the price (per kg) of the first ingredient : 0.25/kg in our example.
- Manually enter the maximum quantity available per day per cow. In our example, we said this was not a limiting factor as we consider fresh grass an unlimited resource. In that case, you can simply enter 99 as maximum value, which is a very high and non limiting value.
- Complete the data for the other ingredients.

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | **Ration calculation** | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0.25	99	41.94	kg/d
Feed 2	Rice bran A	5	5	0	kg/d
Feed 3	Soybean cake	10	2.5	1.22	kg/d
Feed 4	<Empty>	0	3	0	kg/d
Feed 5	<Empty>	0	3	0	kg/d
Feed 6	<Empty>	0	2	0	kg/d
Feed 7	<Empty>	0	5	0	kg/d
Feed 8	<Empty>	0	5	0	kg/d
Feed 9	<Empty>	0	20	0	kg/d
Feed 10	<Empty>	0	20	0	kg/d
Feed ingredient intake, as fed				43.16	kg/d

Admin

### Dairy Cow Ration Calculation

Calculate ration

Needs		Intake	
Energy	94	82	MJ/d
Crude Protein	2.16	1.50	kg/d
Ca	114	4.28	g/d
P	57	7.58	g/d
Max intake	14.25	9.49	kg DM/d
NDF min	30	55.37	% DM
Concentrate max	50	11.57	% DM

Feed Cost (/d)	22.69	Ration price (/kg)	0.53
MIFC (/d)	85.32		

Print Quit



## 3<sup>rd</sup> tab : Milk Income less Feed Cost (MIFC)

- Manually enter the milk return : 12/kg in our example. Milk return is the price at which one kg of milk is sold by the farmer

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Calculate ration

Needs

Energy	94	82	MJ/d
Crude Protein	2,16	1,50	kg/d
Ca	114	4,28	g/d
P	57	7,58	g/d
Max intake	14,25	9,49	kg DM/d
NDF min	30	55,37	% DM
Concentrate max	50	11,57	% DM

Intake

Feed Cost (/d)	22,69	Ration price (/kg)	0,53
MIFC (/d)	85,32		

Admin Print Quit

Cow descriptors	Live weight	Pregnancy (mth)	Live weight gain/loss	Stage of lactation
	450	1	0	Early lactation

Nutrient requirement	DM (kg)	Energy (MJ ME)	Protein (kg/d)	NDF (% DM)	Ca (g/d)	P (g/d)
	13,50	94,00	2,16	30,00	108	54

Nutrient supply	DM (kg)	Energy (MJ ME)	Protein (kg/d)	NDF (% DM)	Ca (g/d)	P (g/d)
	9,49	82,48	1,50	55,37	4,3	7,6

Milk yield	Milk prod (kg/d)	Milk fat (%)	Milk protein (%)	Milk return (/kg)	Milk return (/d)
	9,00	3,50	3,10	12	108,00



## 3<sup>rd</sup> tab : Milk Income less Feed Cost (MIFC)

- Manually enter the milk return : 12/kg in our example. Milk return is the price at which one kg of milk is sold by the farmer
- The total turnover (milk return) of milk production is automatically calculated

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data   Ration calculation   **Milk Income less Feed Cost (MIFC)**   Acknowledgment

Cow descriptors	Live weight	Pregnancy (mth)	Live weight gain/loss	Stage of lactation
	450	1	0	Early lactation

	DM (kg)	Energy (MJ ME)	Protein (kg/d)	NDF (%)	Ca (g/d)	P (g/d)
Nutrient requirement	13,50	94,00	2,16	30,00	108	54
Nutrient supply	9,49	82,48	1,50	55,37	4,3	7,6

	Milk prod (kg/d)	Milk fat (%)	Milk protein (%)	Milk return (/kg)	Milk return (/d)
Milk yield	9,00	3,50	3,10	12	108,00

**Dairy Cow Ration Calculation**

Calculate ration

Needs	Intake	
Energy	94	82 MJ/d
Crude Protein	2,16	1,50 kg/d
Ca	114	4,28 g/d
P	57	7,58 g/d
Max intake	14,25	9,49 kg DM/d
NDF min	30	55,37 % DM
Concentrate max	50	11,57 % DM

Feed Cost (/d)	22,69
MIFC (/d)	85,32

Ration price (/kg)
0,53

Admin   Print   Quit



## 3<sup>rd</sup> tab : Milk Income less Feed Cost (MIFC)

- Manually enter the milk return : 12/kg in our example. Milk return is the price at which one kg of milk is sold by the farmer
- The total turnover (milk return) of milk production is automatically calculated
- The total feed cost has been calculated automatically

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

**Dairy Cow Ration Calculation**

Calculate ration

Needs

Energy	94	82	MJ/d
Crude Protein	2,16	1,50	kg/d
Ca	114	4,28	g/d
P	57	7,58	g/d
Max intake	14,25	9,49	kg DM/d
NDF min	30	55,37	% DM
Concentrate max	50	11,57	% DM

Intake

Energy	94	82	MJ/d
Crude Protein	2,16	1,50	kg/d
Ca	114	4,28	g/d
P	57	7,58	g/d
Max intake	14,25	9,49	kg DM/d
NDF min	30	55,37	% DM
Concentrate max	50	11,57	% DM

Feed Cost (/d) 22,69

MIFC (/d) 85,32

Ration price (/kg) 0,53

Admin Print Quit

**Cow data** **Ration calculation** **Milk Income less Feed Cost (MIFC)** **Acknowledgment**

Cow descriptors	Live weight	Pregnancy (mth)	Live weight gain/loss	Stage of lactation
	450	1	0	Early lactation

Nutrient requirement	DM (kg)	Energy (MJ ME)	Protein (kg/d)	NDF (% DM)	Ca (g/d)	P (g/d)
	13,50	94,00	2,16	30,00	108	54

Nutrient supply	9,49	82,48	1,50	55,37	4,3	7,6
-----------------	------	-------	------	-------	-----	-----

Milk yield	Milk prod (kg/d)	Milk fat (%)	Milk protein (%)	Milk return (/kg)	Milk return (/d)
	9,00	3,50	3,10	12	108,00



## 3<sup>rd</sup> tab : Milk Income less Feed Cost (MIFC)

- Manually enter the milk return : 12/kg in our example. Milk return is the price at which one kg of milk is sold by the farmer
- The total turnover (milk return) of milk production is automatically calculated
- The total feed cost has been calculated automatically
- The total turnover less feed cost gives the MIFC per day, the amount of money left to farmer per day

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Dairy Cow Ration Calculation

Calculate ration

Needs

Energy	94	82	MJ/d
Crude Protein	2,16	1,50	kg/d
Ca	114	4,28	g/d
P	57	7,58	g/d
Max intake	14,25	9,49	kg DM/d
NDF min	30	55,37	% DM
Concentrate max	50	11,57	% DM

Intake

Energy	94	82	MJ/d
Crude Protein	2,16	1,50	kg/d
Ca	114	4,28	g/d
P	57	7,58	g/d
Max intake	14,25	9,49	kg DM/d
NDF min	30	55,37	% DM
Concentrate max	50	11,57	% DM

Feed Cost (/d) 22,69

MIFC (/d) 85,32

Ration price (/kg) 0,53

Print Quit

Admin

Cow data

Live weight	Pregnancy (mth)	Live weight gain/loss	Stage of lactation
450	1	0	Early lactation

Cow descriptors

DM (kg)	Energy (MJ ME)	Protein (kg/d)	NDF (%)	Ca (g/d)	P (g/d)
13,50	94,00	2,16	30,00	108	54

Nutrient requirement

DM (kg)	Energy (MJ ME)	Protein (kg/d)	NDF (%)	Ca (g/d)	P (g/d)
13,50	94,00	2,16	30,00	108	54

Nutrient supply

DM (kg)	Energy (MJ ME)	Protein (kg/d)	NDF (%)	Ca (g/d)	P (g/d)
13,50	94,00	2,16	30,00	108	54

Milk yield

Milk prod (kg/d)	Milk fat (%)	Milk protein (%)	Milk return (/kg)	Milk return (/d)
9,00	3,50	3,10	12	108,00



### 3. Ration formulation

Once you've set all data, you have 2  
ways to formulate the ration :

1. Manually
2. Using least cost function

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data   Ration calculation   **Milk Income less Feed Cost (MIFC)**   Acknowledgment

	Live weight	Pregnancy (mth)	Live weight gain/loss	Stage of lactation
Cow descriptors	450	1	0	Early lactation

	DM (kg)	Energy (MJ ME)	Protein (kg/d)	NDF (%)	Ca (g/d)	P (g/d)
Nutrient requirement	13,50	94,00	2,16	30,00	108	54
Nutrient supply	9,49	82,48	1,50	55,37	4,3	7,6

	Milk prod (kg/d)	Milk fat (%)	Milk protein (%)	Milk return (/kg)	Milk return (/d)
Milk yield	9,00	3,50	3,10	12	108,00

**Dairy Cow Ration Calculation**

Calculate ration

Needs	Value	Unit
Energy	94	MJ/d
Crude Protein	2,16	kg/d
Ca	114	g/d
P	57	g/d
Max intake	14,25	kg DM/d
NDF min	30	% DM
Concentrate max	50	% DM

Intake	Value	Unit
Energy	82	MJ/d
Crude Protein	1,50	kg/d
Ca	4,28	g/d
P	7,58	g/d
Max intake	9,49	kg DM/d
NDF min	55,37	% DM
Concentrate max	11,57	% DM

Feed Cost (/d)	Value
Feed Cost (/d)	22,69
MIFC (/d)	85,32

Ration price (/kg)	Value
Ration price (/kg)	0,53

Admin   Print   Quit



### 3. Ration formulation

Once you've set all data, you have 2 ways to formulate the ration :

1. Manually
2. Using least cost function

Whatever your choice will be, manual adjustment and user skills to check and understand nutrient values of the ration are absolutely necessary !

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data   Ration calculation   **Milk Income less Feed Cost (MIFC)**   Acknowledgment

	Live weight	Pregnancy (mth)	Live weight gain/loss	Stage of lactation
Cow descriptors	450	1	0	Early lactation

	DM (kg)	Energy (MJ ME)	Protein (kg/d)	NDF (%)	Ca (g/d)	P (g/d)
Nutrient requirement	13,50	94,00	2,16	30,00	108	54
Nutrient supply	9,49	82,48	1,50	55,37	4,3	7,6

	Milk prod (kg/d)	Milk fat (%)	Milk protein (%)	Milk return (/kg)	Milk return (/d)
Milk yield	9,00	3,50	3,10	12	108,00

**Dairy Cow Ration Calculation**

Calculate ration

Needs	Intake	
Energy	94	82 MJ/d
Crude Protein	2,16	1,50 kg/d
Ca	114	4,28 g/d
P	57	7,58 g/d
Max intake	14,25	9,49 kg DM/d
NDF min	30	55,37 % DM
Concentrate max	50	11,57 % DM

Feed Cost (/d)	22,69	Ration price (/kg)	0,53
MIFC (/d)	85,32		

Admin   Print   Quit





## 3.1 Manual ration formulation

- Manually enter the quantities of each ingredient based on your experience

For example here we've entered :

- 25 kg of fresh grass
- 4.5 kg of rice bran A
- 2.5 kg of soybean cake

The screenshot displays the FAO Ration Tool interface. A red arrow points from the text 'Manually enter the quantities of each ingredient based on your experience' to the 'Fresh feed intake' column in the ingredient table.

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0.25	99	25	kg/d
Feed 2	Rice bran A	5	5	4.5	kg/d
Feed 3	Soybean cake	10	2.5	2.5	kg/d
Feed 4	<Empty>	0	3	0	kg/d
Feed 5	<Empty>	0	3	0	kg/d
Feed 6	<Empty>	0	2	0	kg/d
Feed 7	<Empty>	0	5	0	kg/d
Feed 8	<Empty>	0	5	0	kg/d
Feed 9	<Empty>	0	20	0	kg/d
Feed 10	<Empty>	0	20	0	kg/d
Feed ingredient intake, as fed				32,00	kg/d

**Dairy Cow Ration Calculation**

Needs		Intake	
Energy	94	116	MJ/d
Crude Protein	2,16	2,18	kg/d
Ca	114	12,42	g/d
P	57	88,02	g/d
Max intake	14,25	11,30	kg DM/d
NDF min	30	40,21	% DM
Concentrate max	50	55,75	% DM

Feed Cost (/d) 53,75      Ration price (/kg) 1,68  
MIFC (/d) 54,25

Buttons: Admin, Print, Quit



## 3.1 Manual ration formulation

- Manually enter the quantities of each ingredient based on your experience
- Read the nutritional values of the mix

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | Ration calculation | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0,25	99	25	kg/d
Feed 2	Rice bran A	5	5	4,5	kg/d
Feed 3	Soybean cake	10	2,5	2,5	kg/d
Feed 4	<Empty>	0	3	0	kg/d
Feed 5	<Empty>	0	3	0	kg/d
Feed 6	<Empty>	0	2	0	kg/d
Feed 7	<Empty>	0	5	0	kg/d
Feed 8	<Empty>	0	5	0	kg/d
Feed 9	<Empty>	0	20	0	kg/d
Feed 10	<Empty>	0	20	0	kg/d
Feed ingredient intake, as fed				32,00	kg/d

Admin

### Dairy Cow Ration Calculation

Calculate ration

Needs		Intake	
Energy	94	116	MJ/d
Crude Protein	2,16	2,18	kg/d
Ca	114	12,42	g/d
P	57	88,02	g/d
Max intake	14,25	11,30	kg DM/d
NDF min	30	40,21	% DM
Concentrate max	50	55,75	% DM

Feed Cost (/d)	53,75	Ration price (/kg)	1,68
MIFC (/d)	54,25		

Print Quit



## 3.1 Manual ration formulation

- Manually enter the quantities of each ingredient based on your experience
- Read the nutritional values of the mix and compare with needs.

The screenshot displays the FAO Ration Tool interface. The title bar reads "FAO Ration Tool". The main header includes the FAO logo and the text "Food and Agriculture Organization of the United Nations". Below this, there are four tabs: "Cow data", "Ration calculation" (which is active), "Milk Income less Feed Cost (MIFC)", and "Acknowledgment".

The "Ration calculation" tab contains a table for entering feed ingredients:

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0,25	99	25	kg/d
Feed 2	Rice bran A	5	5	4,5	kg/d
Feed 3	Soybean cake	10	2,5	2,5	kg/d
Feed 4	<Empty>	0	3	0	kg/d
Feed 5	<Empty>	0	3	0	kg/d
Feed 6	<Empty>	0	2	0	kg/d
Feed 7	<Empty>	0	5	0	kg/d
Feed 8	<Empty>	0	5	0	kg/d
Feed 9	<Empty>	0	20	0	kg/d
Feed 10	<Empty>	0	20	0	kg/d
Feed ingredient intake, as fed				32,00	kg/d

Below the table is an "Admin" button. To the right of the table, there is a large red arrow pointing down to the "Calculate ration" button.

The right side of the interface is titled "Dairy Cow Ration Calculation". It features a "Calculate ration" button at the top right. Below this, there are two columns: "Needs" and "Intake".

Needs		Intake	
Energy	94	116	MJ/d
Crude Protein	2,16	2,18	kg/d
Ca	114	12,42	g/d
P	57	88,02	g/d
Max intake	14,25	11,30	kg DM/d
NDF min	30	40,21	% DM
Concentrate max	50	55,75	% DM

Below the "Needs" and "Intake" tables, there are two rows of data:

Feed Cost (/d)	53,75	Ration price (/kg)	1,68
MIFC (/d)	54,25		

At the bottom of the interface, there are three buttons: "Admin", "Print", and "Quit".



## 3.1 Manual ration formulation

- Manually enter the quantities of each ingredient based on your experience
- Read the nutritional values of the mix and compare with needs.

Here for example the mix brings 116 MJ of energy per day while needs are 94 MJ per day, so more than needed. It also brings 2.18 Kg of proteins per day while needs are 2.16 kg per day.

Ca needs are not met so it appears in red.

The screenshot displays the FAO Ration Tool interface. The title bar reads "FAO Ration Tool". The main header includes the FAO logo and the text "Food and Agriculture Organization of the United Nations". Below this, there are four tabs: "Cow data", "Ration calculation" (which is active), "Milk Income less Feed Cost (MIFC)", and "Acknowledgment".

The "Ration calculation" tab contains a table for ingredients:

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0.25	99	25	kg/d
Feed 2	Rice bran A	5	5	4.5	kg/d
Feed 3	Soybean cake	10	2.5	2.5	kg/d
Feed 4	<Empty>	0	3	0	kg/d
Feed 5	<Empty>	0	3	0	kg/d
Feed 6	<Empty>	0	2	0	kg/d
Feed 7	<Empty>	0	5	0	kg/d
Feed 8	<Empty>	0	5	0	kg/d
Feed 9	<Empty>	0	20	0	kg/d
Feed 10	<Empty>	0	20	0	kg/d
Feed ingredient intake, as fed				32,00	kg/d

Below the table is an "Admin" button.

On the right side of the interface, there is a section titled "Dairy Cow Ration Calculation". It features a "Calculate ration" button. Below this, there are two columns: "Needs" and "Intake".

Needs	Intake	
Energy	94	116 MJ/d
Crude Protein	2,16	2,18 kg/d
Ca	114	12,42 g/d
P	57	88,02 g/d
Max intake	14,25	11,30 kg DM/d
NDF min	30	40,21 % DM
Concentrate max	50	55,75 % DM

Below the "Needs" and "Intake" table, there are two rows of data:

Feed Cost (/d)	53,75	Ration price (/kg)	1,68
MIFC (/d)	54,25		

At the bottom right, there are "Print" and "Quit" buttons.

Two large red arrows point from the top right towards the "Calculate ration" button and the "Dairy Cow Ration Calculation" section.



## 3.1 Manual ration formulation

- Manually enter the quantities of each ingredient based on your experience
- Read the nutritional values for the mix and compare with needs.

Make sure :

- The intake nutrient values are very close or slightly above the needs
- You don't exceed maximum quantity available for each ingredient
- Feed intake does not exceed animal intake capacity
- NDF content is higher than minimum required
- Concentrate content does not exceed maximum (which is the case in our example)

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | Ration calculation | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0.25	99	25	kg/d
Feed 2	Rice bran A	5	5	4.5	kg/d
Feed 3	Soybean cake	10	2.5	2.5	kg/d
Feed 4	<Empty>	0	3	0	kg/d
Feed 5	<Empty>	0	3	0	kg/d
Feed 6	<Empty>	0	2	0	kg/d
Feed 7	<Empty>	0	5	0	kg/d
Feed 8	<Empty>	0	5	0	kg/d
Feed 9	<Empty>	0	20	0	kg/d
Feed 10	<Empty>	0	20	0	kg/d
Feed ingredient intake, as fed				32,00	kg/d

Admin

### Dairy Cow Ration Calculation

Calculate ration

Needs		Intake	
Energy	94	116	MJ/d
Crude Protein	2,16	2,18	kg/d
Ca	114	12,42	g/d
P	57	88,02	g/d
Max intake	14,25	11,30	kg DM/d
NDF min	30	40,21	% DM
Concentrate max	50	55,75	% DM

Feed Cost (/d) 53,75      Ration price (/kg) 1,68

MIFC (/d) 54,25

Print      Quit



## 3.1 Manual ration formulation

- Manually enter the quantities of each ingredient based on your experience
- Read the nutritional values for the mix and compare with needs.
- Adjust manually if necessary and check again.

If we change:

- fresh grass content from 25 to 30%
- Rice bran A from 4,5 to 4
- Soybean cake from 2,5 to 2,3

Requirements are met and concentrate content is below the maximum.

FAO Ration Tool

Food and Agriculture Organization of the United Nations

Cow data | Ration calculation | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0.25	99	30	kg/d
Feed 2	Rice bran A	5	5	4	kg/d
Feed 3	Soybean cake	10	2.5	2.3	kg/d
Feed 4	<Empty>	0	3	0	kg/d
Feed 5	<Empty>	0	3	0	kg/d
Feed 6	<Empty>	0	2	0	kg/d
Feed 7	<Empty>	0	5	0	kg/d
Feed 8	<Empty>	0	5	0	kg/d
Feed 9	<Empty>	0	20	0	kg/d
Feed 10	<Empty>	0	20	0	kg/d
Feed ingredient intake, as fed				36,30	kg/d

**Dairy Cow Ration Calculation**

**Calculate ration**

Needs	Intake	
Energy	94	117 MJ/d
Crude Protein	2,16	2,16 kg/d
Ca	108	11,31 g/d
P	54	78,72 g/d
Max intake	13,5	11,67 kg DM/d
NDF min	30	42,72 % DM
Concentrate max	50	48,59 % DM

Feed Cost (/d) 50,50      Ration price (/kg) 1,39

MIFC (/d) 57,50

Admin      Print      Quit



## 3.1 Manual ration formulation

- Manually enter the quantities of each ingredient based on your experience
- Read the nutritional values for the mix and compare with needs.
- Adjust manually if necessary and check again.

FAO Ration Tool

Food and Agriculture Organization of the United Nations

Cow data | Ration calculation | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0.25	99	30	kg/d
Feed 2	Rice bran A	5	5	4	kg/d
Feed 3	Soybean cake	10	2.5	2.3	kg/d
Feed 4	<Empty>	0	3	0	kg/d
Feed 5	<Empty>	0	3	0	kg/d
Feed 6	<Empty>	0	2	0	kg/d
Feed 7	<Empty>	0	5	0	kg/d
Feed 8	<Empty>	0	5	0	kg/d
Feed 9	<Empty>	0	20	0	kg/d
Feed 10	<Empty>	0	20	0	kg/d
Feed ingredient intake, as fed				36,30	kg/d

Calculate ration

Needs

	Value	Unit
Energy	94	MJ/d
Crude Protein	2,16	kg/d
Ca	108	g/d
P	54	g/d
Max intake	13,5	kg DM/d
NDF min	30	% DM
Concentrate max	50	% DM

Intake

	Value	Unit
Energy	117	MJ/d
Crude Protein	2,16	kg/d
Ca	11,31	g/d
P	78,72	g/d
Max intake	11,67	kg DM/d
NDF min	42,72	% DM
Concentrate max	48,59	% DM

Feed Cost (/d) 50,50

MIFC (/d) 57,50

Ration price (/kg) 1,39

Admin Print Quit

In that example needs are fulfilled but energy is really above minimum required.





## 3.1 Manual ration formulation

- Manually enter the quantities of each ingredient based on your experience
- Read the nutritional values for the mix and compare with needs.
- Adjust manually if necessary and check again.

For your information, the animal intake capacity is calculated as below :

= 3% of live weight if milk production is below 20 kg per day

or

= 3.5% of live weight if milk production is equal or above 20 kg per day

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | Ration calculation | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0.25	99	30	kg/d
Feed 2	Rice bran A	5	5	4	kg/d
Feed 3	Soybean cake	10	2.5	2.3	kg/d
Feed 4	<Empty>	0	3	0	kg/d
Feed 5	<Empty>	0	3	0	kg/d
Feed 6	<Empty>	0	2	0	kg/d
Feed 7	<Empty>	0	5	0	kg/d
Feed 8	<Empty>	0	5	0	kg/d
Feed 9	<Empty>	0	20	0	kg/d
Feed 10	<Empty>	0	20	0	kg/d
Feed ingredient intake, as fed				36,30	kg/d

Calculate ration

Needs		Intake	
Energy	94	117	MJ/d
Crude Protein	2,16	2,16	kg/d
Ca	108	11,31	g/d
P	54	78,72	g/d
Max intake	13,5	11,67	kg DM/d
NDF min	30	42,72	% DM
Concentrate max	50	48,59	% DM

Feed Cost (/d) 50,50

MIFC (/d) 57,50

Ration price (/kg) 1,39

Admin Print Quit



## 3.1 Manual ration formulation

- Manually enter the quantities of each ingredient based on your experience
- Read the nutritional values for the mix and compare with needs.
- Adjust manually if necessary and check again.
- Control the ration price, the feed cost per day and the MIFC per day

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | Ration calculation | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0.25	99	30	kg/d
Feed 2	Rice bran A	5	5	4	kg/d
Feed 3	Soybean cake	10	2.5	2.3	kg/d
Feed 4	<Empty>	0	3	0	kg/d
Feed 5	<Empty>	0	3	0	kg/d
Feed 6	<Empty>	0	2	0	kg/d
Feed 7	<Empty>	0	5	0	kg/d
Feed 8	<Empty>	0	5	0	kg/d
Feed 9	<Empty>	0	20	0	kg/d
Feed 10	<Empty>	0	20	0	kg/d
Feed ingredient intake, as fed				36,30	kg/d

Calculate ration

Needs

Energy	94	117	MJ/d
Crude Protein	2,16	2,16	kg/d
Ca	108	11,31	g/d
P	54	78,72	g/d
Max intake	13,5	11,67	kg DM/d
NDF min	30	42,72	% DM
Concentrate max	50	48,59	% DM

Intake

Feed Cost (/d)	50,50	Ration price (/kg)	1,39
MIFC (/d)	57,50		

Admin

Print

Quit



## 3.1 Manual ration formulation

This manual method requires you to know well your ingredients and what they will bring into the ration as nutritional values. This is an excellent way to practice ration formulation but the result will not be an optimal solution and you may probably loose money. To get the best solution an algorithm needs to be applied, which will give least cost ration for a targeted performance

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | Ration calculation | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0.25	99	30	kg/d
Feed 2	Rice bran A	5	5	4	kg/d
Feed 3	Soybean cake	10	2.5	2.3	kg/d
Feed 4	<Empty>	0	3	0	kg/d
Feed 5	<Empty>	0	3	0	kg/d
Feed 6	<Empty>	0	2	0	kg/d
Feed 7	<Empty>	0	5	0	kg/d
Feed 8	<Empty>	0	5	0	kg/d
Feed 9	<Empty>	0	20	0	kg/d
Feed 10	<Empty>	0	20	0	kg/d
Feed ingredient intake, as fed				36,30	kg/d

Admin

### Dairy Cow Ration Calculation

Calculate ration

Needs		Intake	
Energy	94	117	MJ/d
Crude Protein	2,16	2,16	kg/d
Ca	108	11,31	g/d
P	54	78,72	g/d
Max intake	13,5	11,67	kg DM/d
NDF min	30	42,72	% DM
Concentrate max	50	48,59	% DM

Feed Cost (/d) 50,50      Ration price (/kg) 1,39

MIFC (/d) 57,50

Print      Quit



## 3.2 Least cost ration formulation

This is what the  
« FAO Ration tool » will do !

Note :

Calcium and phosphorus intakes are not automatically calculated by the program and require manual adjustment.

Moreover, NDF and concentrate values have to be manually adjusted in case it is out of range.

The screenshot displays the FAO Ration Tool interface, specifically the 'Dairy Cow Ration Calculation' window. The interface is divided into several sections:

- Top Bar:** Features the FAO logo and the text 'Food and Agriculture Organization of the United Nations'.
- Navigation Tabs:** Includes 'Cow data', 'Ration calculation' (active), 'Milk Income less Feed Cost (MIFC)', and 'Acknowledgment'.
- Ingredient Table:** A table with columns for 'Ingredient name', 'Price (/kg)', 'Max (kg/d)', and 'Fresh feed intake'. It lists 10 feeds, with the first three being 'Fresh grass', 'Rice bran A', and 'Soybean cake'. The last seven feeds are marked as '<Empty>'. The total 'Feed ingredient intake, as fed' is 36,30 kg/d.
- Needs and Intake Section:** Compares nutritional needs with current intake for various components: Energy (94 vs 117 MJ/d), Crude Protein (2,16 vs 2,16 kg/d), Ca (108 vs 11,31 g/d), P (54 vs 78,72 g/d), Max intake (13,5 vs 11,67 kg DM/d), NDF min (30 vs 42,72 % DM), and Concentrate max (50 vs 48,59 % DM).
- Cost and Price Section:** Shows 'Feed Cost (/d)' as 50,50, 'MIFC (/d)' as 57,50, and 'Ration price (/kg)' as 1,39.
- Buttons:** Includes 'Admin', 'Print', and 'Quit' buttons at the bottom.



## 3.2 Least cost ration formulation

- Just click on the « Calculate ration » button

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

**Dairy Cow Ration Calculation**

Calculate ration

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0.25	99	30	kg/d
Feed 2	Rice bran A	5	5	4	kg/d
Feed 3	Soybean cake	10	2.5	2.3	kg/d
Feed 4	<Empty>	0	3	0	kg/d
Feed 5	<Empty>	0	3	0	kg/d
Feed 6	<Empty>	0	2	0	kg/d
Feed 7	<Empty>	0	5	0	kg/d
Feed 8	<Empty>	0	5	0	kg/d
Feed 9	<Empty>	0	20	0	kg/d
Feed 10	<Empty>	0	20	0	kg/d
Feed ingredient intake, as fed				36,30	kg/d

Needs

	Intake	
Energy	94	117 MJ/d
Crude Protein	2,16	2,16 kg/d
Ca	108	11,31 g/d
P	54	78,72 g/d
Max intake	13,5	11,67 kg DM/d
NDF min	30	42,72 % DM
Concentrate max	50	48,59 % DM

Feed Cost (/d) 50,50

MIFC (/d) 57,50

Ration price (/kg) 1,39

Admin Print Quit

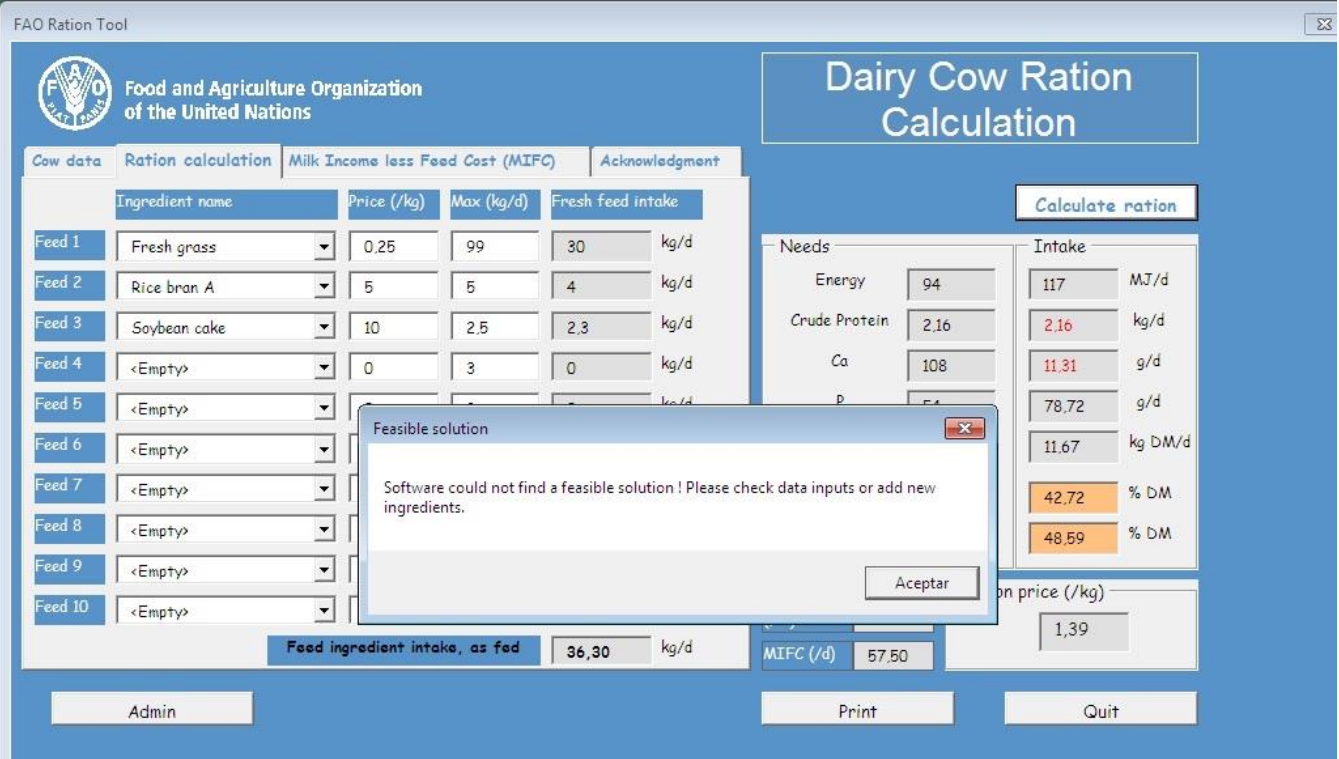


## 3.2 Least cost ration formulation

- Just click on the « Calculate ration » button
- In our example, we get an error message. It means with the constraints (animal needs, its maximum intake capacity, the maximum quantity of concentrate we want in the ration), the program was unable to find a solution.

Other constraints are set but do not appear on the screen :

- Maximum intake of energy
- minimum of DM intake.



The screenshot shows the FAO Ration Tool interface for Dairy Cow Ration Calculation. A modal window titled 'Feasible solution' is displayed in the center, stating: 'Software could not find a feasible solution ! Please check data inputs or add new ingredients.' with an 'Acceptar' button.

The background interface includes the following elements:

- Top Bar:** FAO Logo, 'Food and Agriculture Organization of the United Nations', and 'Dairy Cow Ration Calculation'.
- Tabs:** 'Cow data', 'Ration calculation' (active), 'Milk Income less Feed Cost (MIFC)', and 'Acknowledgment'.
- Ingredient Table:**

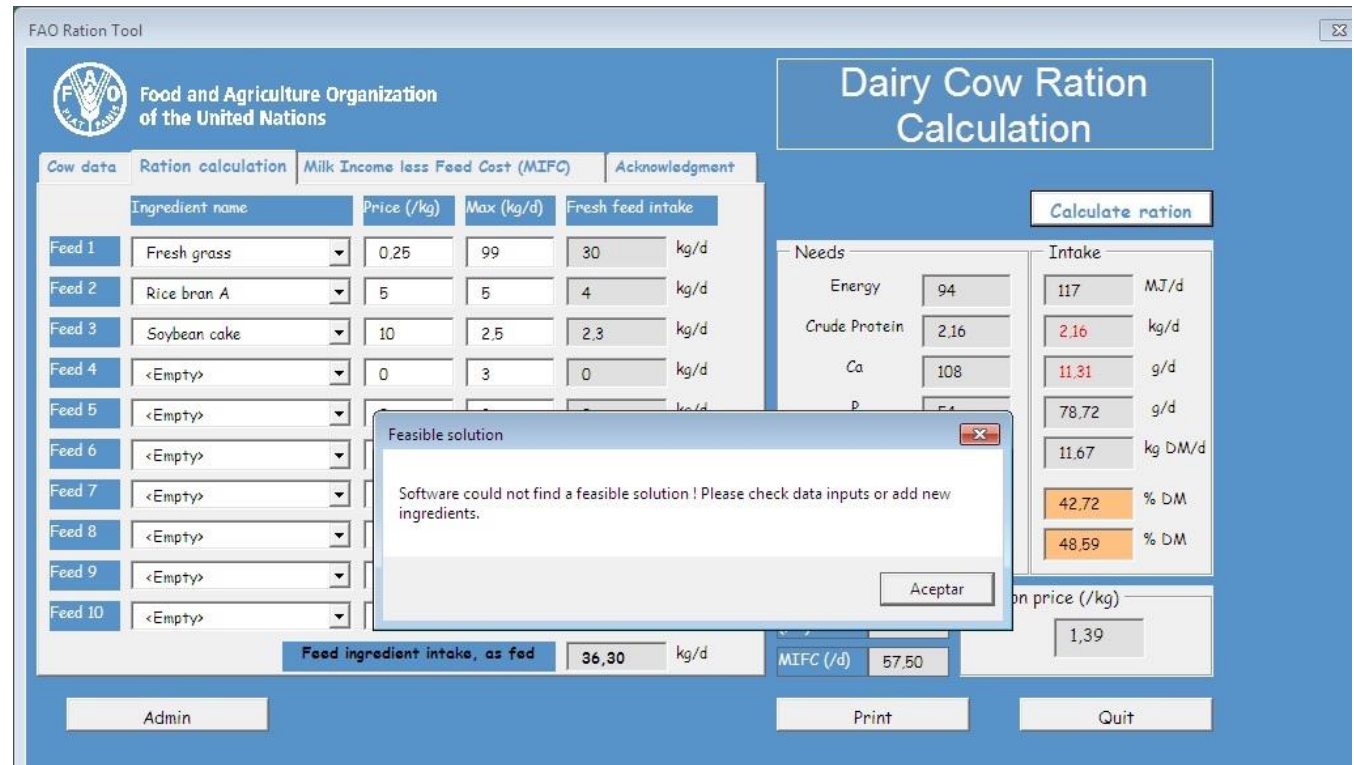
	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0.25	99	30	kg/d
Feed 2	Rice bran A	5	5	4	kg/d
Feed 3	Soybean cake	10	2.5	2.3	kg/d
Feed 4	<Empty>	0	3	0	kg/d
Feed 5	<Empty>				kg/d
Feed 6	<Empty>				kg/d
Feed 7	<Empty>				kg/d
Feed 8	<Empty>				kg/d
Feed 9	<Empty>				kg/d
Feed 10	<Empty>				kg/d
- Needs and Intake Summary:**

Needs	Intake	Unit
Energy	94	MJ/d
Crude Protein	2.16	kg/d
Ca	108	g/d
P	78.72	g/d
	11.67	kg DM/d
	42.72	% DM
	48.59	% DM
- Bottom Bar:** 'Feed ingredient intake, as fed' (36.30 kg/d), 'MIFC (/d)' (57.50), and a 'Feed price (/kg)' (1.39).
- Buttons:** 'Admin', 'Print', and 'Quit'.

## 3.2 Least cost ration formulation

### 2 ways to solve it :

1. Check if it is possible to increase the value of maximum quantity available in the tabs under Max (kg/d)
2. Add one or several ingredients that can be supplied from the market



The screenshot displays the FAO Ration Tool interface for Dairy Cow Ration Calculation. A modal dialog box titled "Feasible solution" is open, displaying the message: "Software could not find a feasible solution ! Please check data inputs or add new ingredients." with an "Acceptar" button. The background interface includes a table for ingredient data and a summary of needs and intake.

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake
Feed 1	Fresh grass	0.25	99	30 kg/d
Feed 2	Rice bran A	5	5	4 kg/d
Feed 3	Soybean cake	10	2.5	2.3 kg/d
Feed 4	<Empty>	0	3	0 kg/d
Feed 5	<Empty>			
Feed 6	<Empty>			
Feed 7	<Empty>			
Feed 8	<Empty>			
Feed 9	<Empty>			
Feed 10	<Empty>			

Needs		Intake	
Energy	94	117	MJ/d
Crude Protein	2.16	2.16	kg/d
Ca	108	11.31	g/d
P		78.72	g/d
		11.67	kg DM/d
		42.72	% DM
		48.59	% DM

Feed ingredient intake, as fed: 36.30 kg/d  
MIFC (/d): 57.50  
on price (/kg): 1.39

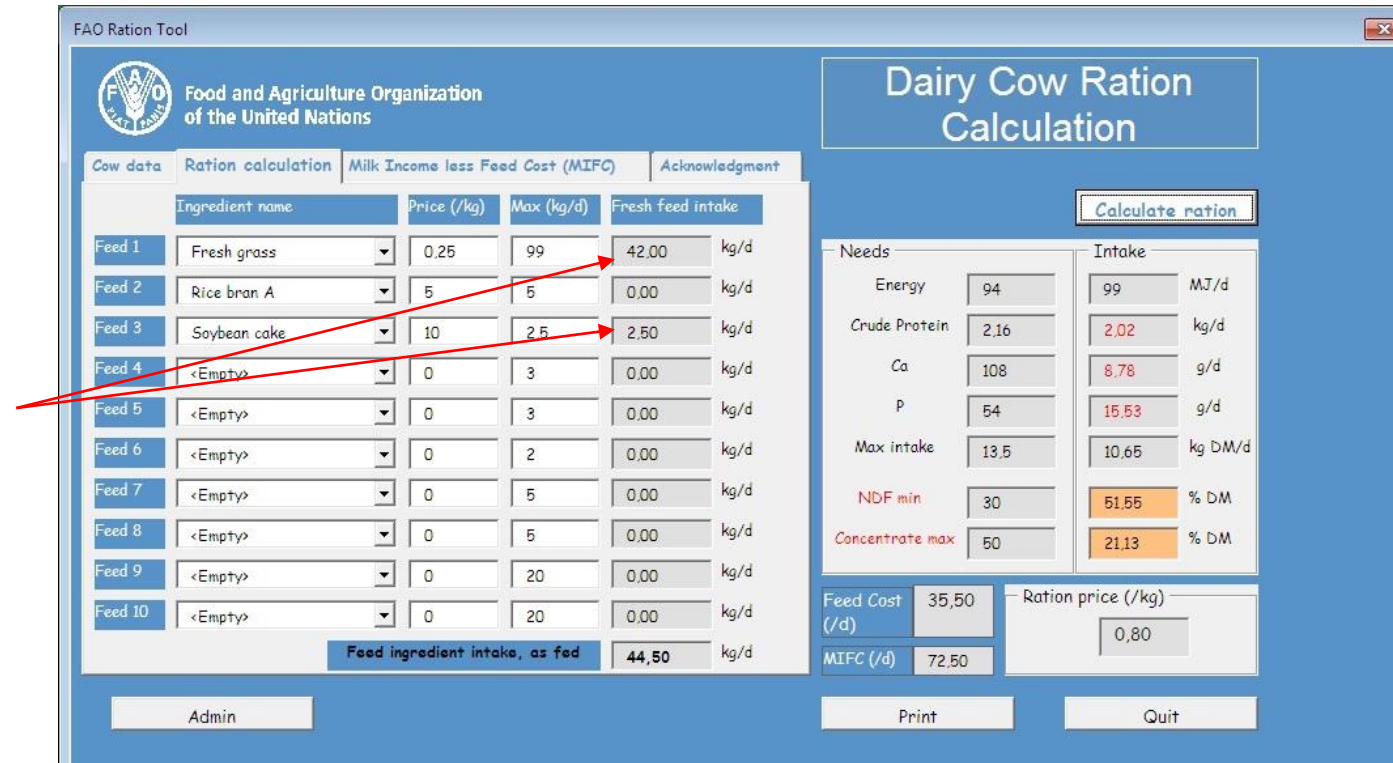
Buttons: Admin, Print, Quit

*Note : decreasing the price will not change anything as the priority of the program is to find a solution whatever the price is, although it will always try to get the cheapest solution.*



## 3.2 Least cost ration formulation

In that case the program did not find any optimal solution, but has found an approximative solution. You can see that as the quantities of ingredients have changed in fresh feed intake column



FAO Ration Tool

Food and Agriculture Organization of the United Nations

Tab: Cow data | **Ration calculation** | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0,25	99	42,00	kg/d
Feed 2	Rice bran A	5	5	0,00	kg/d
Feed 3	Soybean cake	10	2,5	2,50	kg/d
Feed 4	<Empty>	0	3	0,00	kg/d
Feed 5	<Empty>	0	3	0,00	kg/d
Feed 6	<Empty>	0	2	0,00	kg/d
Feed 7	<Empty>	0	5	0,00	kg/d
Feed 8	<Empty>	0	5	0,00	kg/d
Feed 9	<Empty>	0	20	0,00	kg/d
Feed 10	<Empty>	0	20	0,00	kg/d
Feed ingredient intake, as fed				44,50	kg/d

Buttons: Admin

**Dairy Cow Ration Calculation**

Calculate ration

Needs		Intake		
Energy	94	99		MJ/d
Crude Protein	2,16	2,02		kg/d
Ca	108	8,78		g/d
P	54	15,53		g/d
Max intake	13,5	10,65		kg DM/d
NDF min	30	51,55		% DM
Concentrate max	50	21,13		% DM

Feed Cost (/d) 35,50      Ration price (/kg) 0,80

MIFC (/d) 72,50

Buttons: Print      Quit

## 3.2 Least cost ration formulation

1. Try to get more quantities of an ingredient and increase the maximum quantity available

If the quantity of an ingredient has reached its maximum availability, it probably means this ingredient is very important for the ration.

This is the case for soybean cake.

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data   Ration calculation   Milk Income less Feed Cost (MIFC)   Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0,25	99	42,00	kg/d
Feed 2	Rice bran A	5	5	0,00	kg/d
Feed 3	Soybean cake	10	2,5	2,50	kg/d
Feed 4	<Empty>	0	3	0,00	kg/d
Feed 5	<Empty>	0	3	0,00	kg/d
Feed 6	<Empty>	0	2	0,00	kg/d
Feed 7	<Empty>	0	5	0,00	kg/d
Feed 8	<Empty>	0	5	0,00	kg/d
Feed 9	<Empty>	0	20	0,00	kg/d
Feed 10	<Empty>	0	20	0,00	kg/d
Feed ingredient intake, as fed				44,50	kg/d

Admin

### Dairy Cow Ration Calculation

Calculate ration

Needs		Intake	
Energy	94	99	MJ/d
Crude Protein	2,16	2,02	kg/d
Ca	108	8,78	g/d
P	54	15,53	g/d
Max intake	13,5	10,65	kg DM/d
NDF min	30	51,55	% DM
Concentrate max	50	21,13	% DM

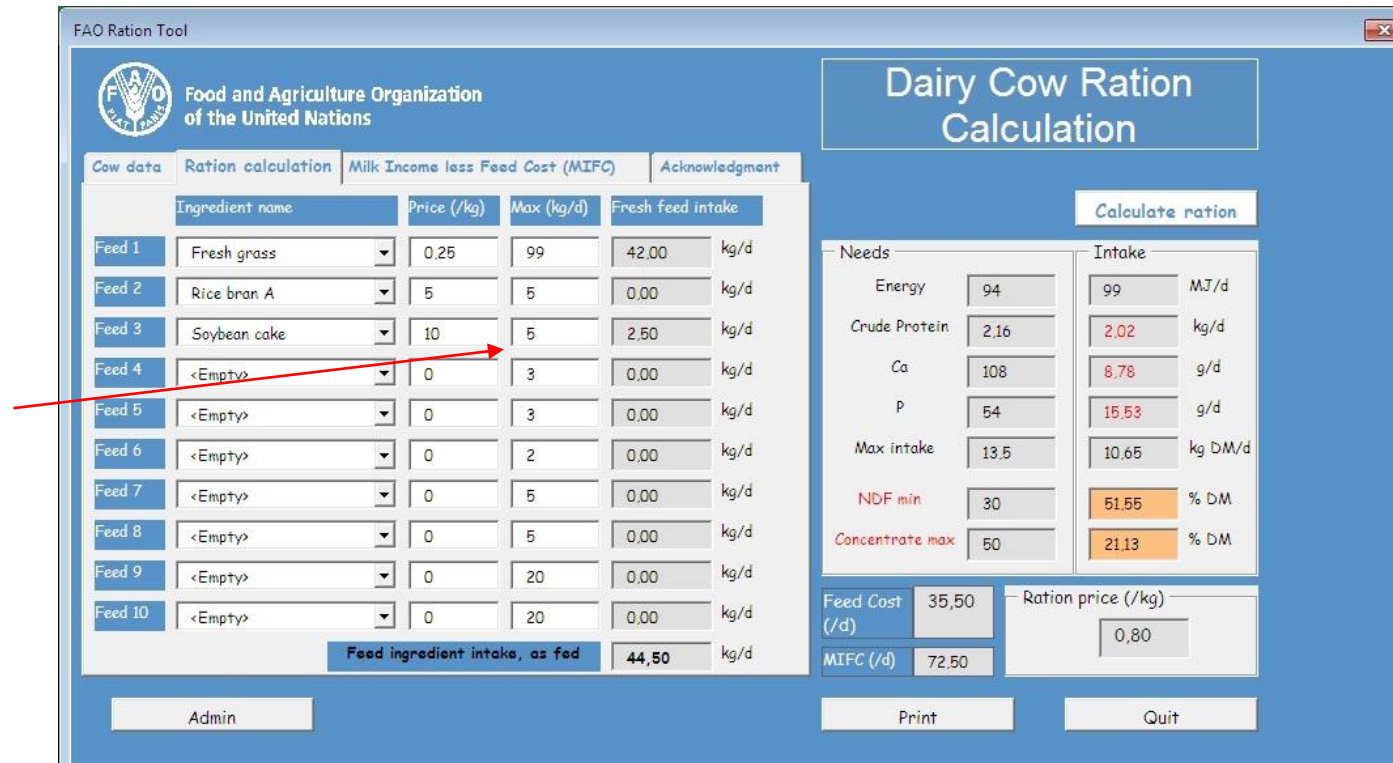
Feed Cost (/d)	35,50	Ration price (/kg)	0,80
MIFC (/d)	72,50		

Print   Quit

## 3.2 Least cost ration formulation

1. Try to get more quantities of an ingredient and increase the maximum quantity available

Let's say that the farmer can purchase 2 bags of soybean cake instead of 1, which would then allow us to increase the maximum from 2.5 to 5 kg per day per cow. Launch a new calculation.



FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | Ration calculation | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake
Feed 1	Fresh grass	0.25	99	42.00 kg/d
Feed 2	Rice bran A	5	5	0.00 kg/d
Feed 3	Soybean cake	10	5	2.50 kg/d
Feed 4	<Empty>	0	3	0.00 kg/d
Feed 5	<Empty>	0	3	0.00 kg/d
Feed 6	<Empty>	0	2	0.00 kg/d
Feed 7	<Empty>	0	5	0.00 kg/d
Feed 8	<Empty>	0	5	0.00 kg/d
Feed 9	<Empty>	0	20	0.00 kg/d
Feed 10	<Empty>	0	20	0.00 kg/d
Feed ingredient intake, as fed				44.50 kg/d

Admin

### Dairy Cow Ration Calculation

Calculate ration

Needs		Intake	
Energy	94	99	MJ/d
Crude Protein	2.16	2.02	kg/d
Ca	108	8.78	g/d
P	54	15.53	g/d
Max intake	13.5	10.65	kg DM/d
NDF min	30	51.55	% DM
Concentrate max	50	21.13	% DM

Feed Cost (/d) 35.50      Ration price (/kg) 0.80

MIFC (/d) 72.50

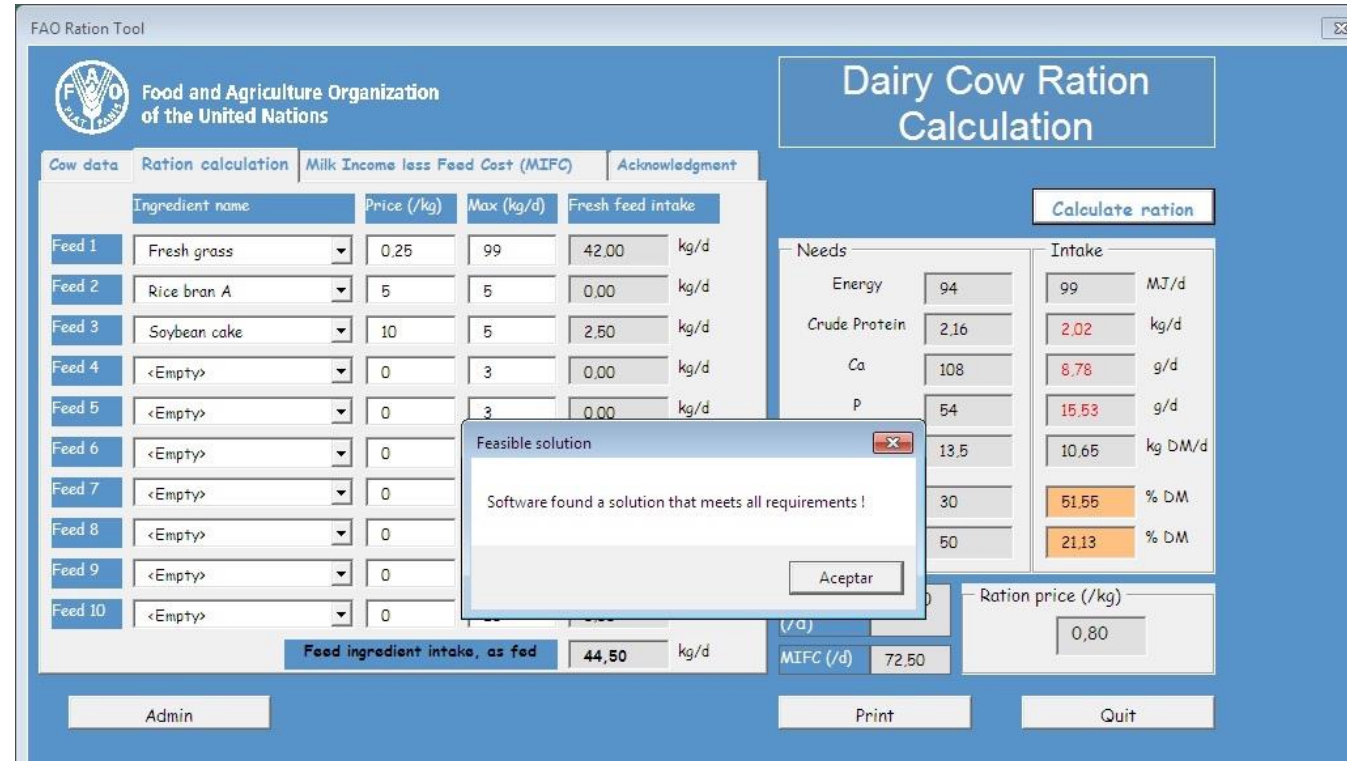
Print      Quit

## 3.2 Least cost ration formulation

1. Try to get more quantities of an ingredient and increase the maximum quantity available

Let's say that the farmer can purchase 2 bags of soybean cake instead of 1, which would then allow us to increase the maximum from 2.5 to 5 kg per day per cow. Launch a new calculation.

Program has now found an optimal solution.



FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Dairy Cow Ration Calculation

Calculate ration

Cow data	Ration calculation	Milk Income less Feed Cost (MIFC)	Acknowledgment
Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake
Feed 1: Fresh grass	0.25	99	42.00 kg/d
Feed 2: Rice bran A	5	5	0.00 kg/d
Feed 3: Soybean cake	10	5	2.50 kg/d
Feed 4: <Empty>	0	3	0.00 kg/d
Feed 5: <Empty>	0	3	0.00 kg/d
Feed 6: <Empty>	0		
Feed 7: <Empty>	0		
Feed 8: <Empty>	0		
Feed 9: <Empty>	0		
Feed 10: <Empty>	0		

Needs:

Energy	94	99	MJ/d
Crude Protein	2.16	2.02	kg/d
Ca	108	8.78	g/d
P	54	15.53	g/d
	13.5	10.65	kg DM/d
	30	51.55	% DM
	50	21.13	% DM

Intake:

Feasible solution

Software found a solution that meets all requirements !

Acceptar

Feed ingredient intake, as fed: 44.50 kg/d

MIFC (/d): 72.50

Ration price (/kg): 0.80

Admin Print Quit





## 3.2 Least cost ration formulation

1. Try to get more quantities of an ingredient and increase the maximum quantity available

Let's say that the farmer can purchase 2 bags of soybean cake instead of 1, which would then allow us to increase the maximum from 2.5 to 5 kg per day per cow. Launch a new calculation.

Program has now found an optimal solution. Quantity of soybean cake has increased and is not a limiting factor anymore.

The screenshot displays the FAO Ration Tool interface for Dairy Cow Ration Calculation. The 'Ration calculation' tab is active, showing a table of ingredients and their quantities. A red arrow points to the 'Max (kg/d)' column for 'Soybean cake', which has been increased from 2.5 to 5. The 'Fresh feed intake' column shows 36.91 kg/d for 'Fresh grass' and 3.15 kg/d for 'Soybean cake'. The 'Feed ingredient intake, as fed' is 40.06 kg/d. The 'Needs' section on the right shows the required amounts for Energy (94 MJ/d), Crude Protein (2.16 kg/d), Ca (108 g/d), and P (54 g/d). The 'Intake' section shows the actual amounts: Energy (99 MJ/d), Crude Protein (2.16 kg/d), Ca (11.06 g/d), and P (19.56 g/d). The 'Max intake' is 13.5 kg DM/d, and the 'NDF min' is 30% DM. The 'Concentrate max' is 50% DM. The 'Feed Cost (/d)' is 40.73, and the 'MIFC (/d)' is 67.27. The 'Ration price (/kg)' is 1.02. The 'Calculate ration' button is visible at the top right of the results section.

Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake
Feed 1: Fresh grass	0.25	99	36.91 kg/d
Feed 2: Rice bran A	5	5	0.00 kg/d
Feed 3: Soybean cake	10	5	3.15 kg/d
Feed 4: <Empty>	0	3	0.00 kg/d
Feed 5: <Empty>	0	3	0.00 kg/d
Feed 6: <Empty>	0	2	0.00 kg/d
Feed 7: <Empty>	0	5	0.00 kg/d
Feed 8: <Empty>	0	5	0.00 kg/d
Feed 9: <Empty>	0	20	0.00 kg/d
Feed 10: <Empty>	0	20	0.00 kg/d

Feed ingredient intake, as fed: 40.06 kg/d

**Needs**

Needs	Intake
Energy	94 MJ/d
Crude Protein	2.16 kg/d
Ca	108 g/d
P	54 g/d
Max intake	13.5 kg DM/d
NDF min	30 % DM
Concentrate max	50 % DM

**Feed Cost (/d)**: 40.73  
**MIFC (/d)**: 67.27  
**Ration price (/kg)**: 1.02



## 3.2 Least cost ration formulation

- On the contrary, an ingredient that is not included is probably not interesting because of its nutritional composition or, as the program has found a solution, because of its price. To decrease its price can make the ingredient more interesting. For example, change rice bran A price from 5 to 0.5 and launch a new calculation.

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data Ration calculation Milk Income less Feed Cost (MIFC) Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake
Feed 1	Fresh grass	0.25	99	36.91 kg/d
Feed 2	Rice bran A	5	5	0.00 kg/d
Feed 3	Soybean cake	10	5	3.15 kg/d
Feed 4	<Empty>	0	3	0.00 kg/d
Feed 5	<Empty>	0	3	0.00 kg/d
Feed 6	<Empty>	0	2	0.00 kg/d
Feed 7	<Empty>	0	5	0.00 kg/d
Feed 8	<Empty>	0	5	0.00 kg/d
Feed 9	<Empty>	0	20	0.00 kg/d
Feed 10	<Empty>	0	20	0.00 kg/d

Feed ingredient intake, as fed 40.06 kg/d

Calculate ration

Needs

Energy	94	99	MJ/d
Crude Protein	2.16	2.16	kg/d
Ca	108	11.06	g/d
P	54	19.56	g/d
Max intake	13.5	10.22	kg DM/d
NDF min	30	48.90	% DM
Concentrate max	50	27.75	% DM

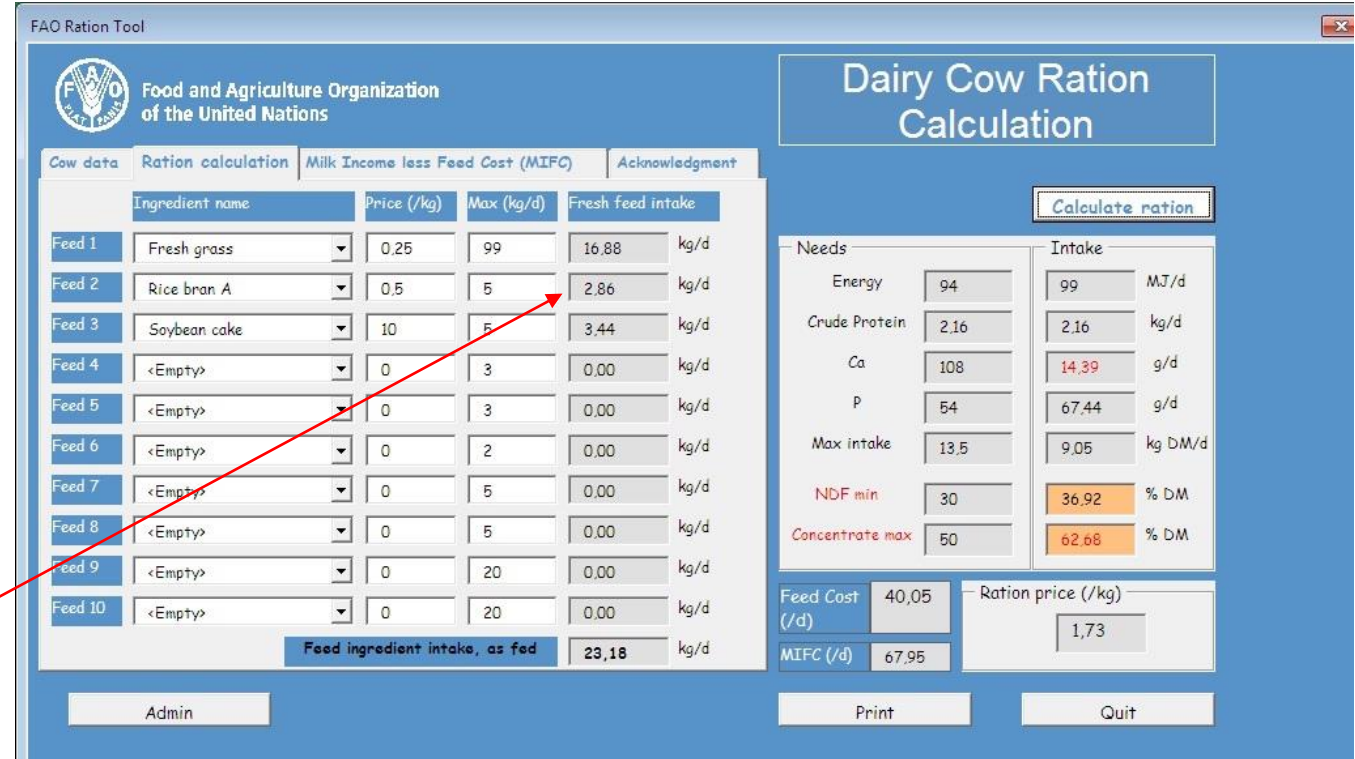
Intake

Feed Cost (/d)	40.73	Ration price (/kg)	1.02
MIFC (/d)	67.27		

Print Quit

## 3.2 Least cost ration formulation

- On the contrary, an ingredient that is not included is probably not interesting because of its nutritional composition or, as the program has found a solution, because of its price. To decrease its price can make the ingredient more interesting. For example, change rice bran A price from 5 to 0.5 and launch a new calculation.
- Rice bran A has become interesting and enter the ration. However concentrate content is too high and manual adjustment is needed.



FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | Ration calculation | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0,25	99	16,88	kg/d
Feed 2	Rice bran A	0,5	5	2,86	kg/d
Feed 3	Soybean cake	10	5	3,44	kg/d
Feed 4	<Empty>	0	3	0,00	kg/d
Feed 5	<Empty>	0	3	0,00	kg/d
Feed 6	<Empty>	0	2	0,00	kg/d
Feed 7	<Empty>	0	5	0,00	kg/d
Feed 8	<Empty>	0	5	0,00	kg/d
Feed 9	<Empty>	0	20	0,00	kg/d
Feed 10	<Empty>	0	20	0,00	kg/d
Feed ingredient intake, as fed				23,18	kg/d

Admin

### Dairy Cow Ration Calculation

Calculate ration

Needs		Intake		
Energy	94	99		MJ/d
Crude Protein	2,16	2,16		kg/d
Ca	108	14,39		g/d
P	54	67,44		g/d
Max intake	13,5	9,05		kg DM/d
NDF min	30	36,92		% DM
Concentrate max	50	62,68		% DM

Feed Cost (/d) 40,05

MIFC (/d) 67,95

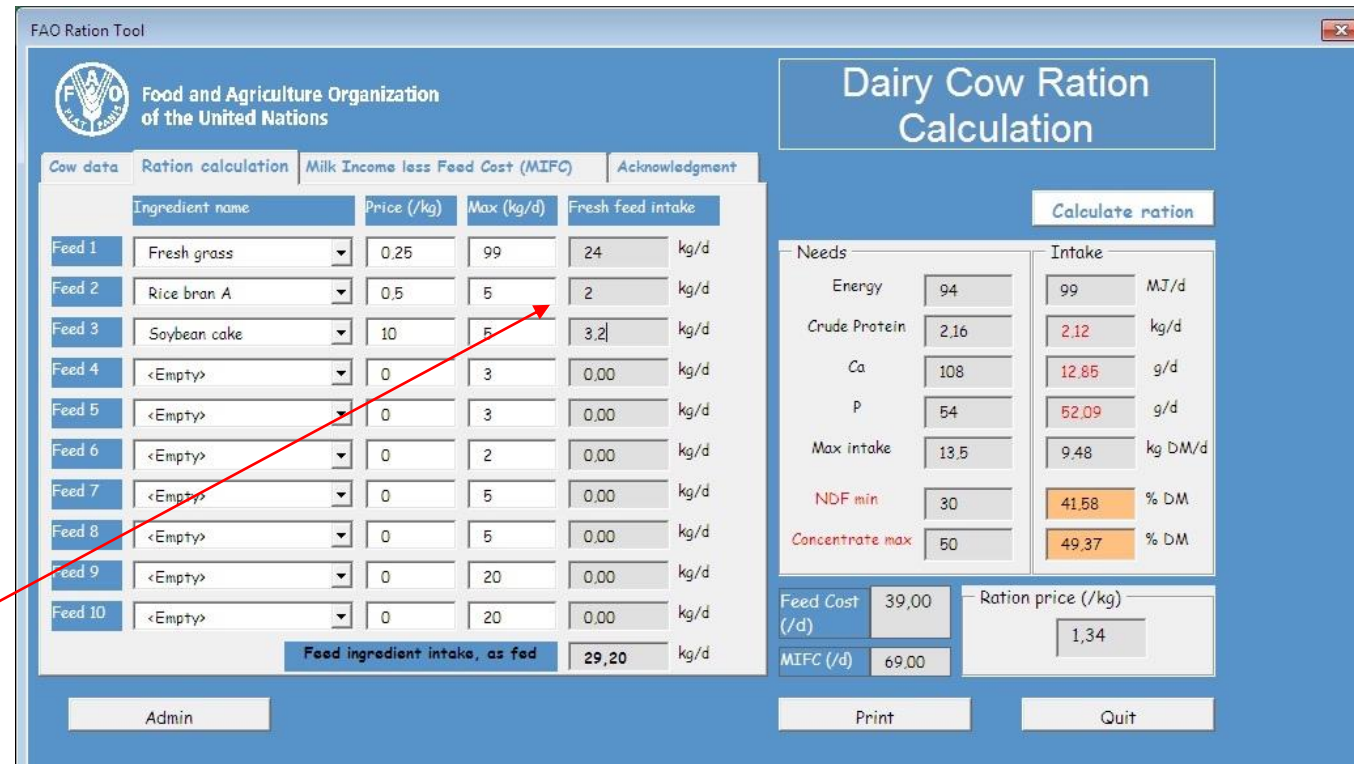
Ration price (/kg) 1,73

Print Quit



## 3.2 Least cost ration formulation

- On the contrary, an ingredient that is not included is probably not interesting because of its nutritional composition or, as the program has found a solution, because of its price. To decrease its price can make the ingredient more interesting. For example, change rice bran A price from 5 to 0.5 and launch a new calculation.
- Rice bran A has become interesting and enter the ration. However concentrate content is too high and manual adjustment is needed.



FAO Ration Tool

Food and Agriculture Organization of the United Nations

Cow data   Ration calculation   Milk Income less Feed Cost (MIFC)   Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0.25	99	24	kg/d
Feed 2	Rice bran A	0.5	5	2	kg/d
Feed 3	Soybean cake	10	5	3.2	kg/d
Feed 4	<Empty>	0	3	0.00	kg/d
Feed 5	<Empty>	0	3	0.00	kg/d
Feed 6	<Empty>	0	2	0.00	kg/d
Feed 7	<Empty>	0	5	0.00	kg/d
Feed 8	<Empty>	0	5	0.00	kg/d
Feed 9	<Empty>	0	20	0.00	kg/d
Feed 10	<Empty>	0	20	0.00	kg/d
Feed ingredient intake, as fed				29.20	kg/d

Admin

### Dairy Cow Ration Calculation

Calculate ration

Needs		Intake	
Energy	94	99	MJ/d
Crude Protein	2.16	2.12	kg/d
Ca	108	12.85	g/d
P	54	52.09	g/d
Max intake	13.5	9.48	kg DM/d
NDF min	30	41.58	% DM
Concentrate max	50	49.37	% DM

Feed Cost (/d) 39.00   Ration price (/kg) 1.34  
 MIFC (/d) 69.00

Print   Quit

Here an example of manual adjustment



## 3.2 Least cost ration formulation

- Re-enter 5 for the price of rice bran A and 2.5kg for the quantity of soybean cake available and let's say now that you have the opportunity to buy a 60 kg bag of brewers grain. It costs 240. You'll feed your 2 cows with it and your finances allows you to buy one bag every 10 days. Price is then 4 per kg and you can then use 3 kg per cow per day maximum.

**Do not click on the « Calculate ration » button yet !**

**Try to calculate manually and find a solution.**

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | Ration calculation | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0.25	99	24	kg/d
Feed 2	Rice bran A	5	5	2	kg/d
Feed 3	Soybean cake	10	2.5	3.2	kg/d
Feed 4	Brewers grain	4	3	0.00	kg/d
Feed 5	<Empty>	0	3	0.00	kg/d
Feed 6	<Empty>	0	2	0.00	kg/d
Feed 7	<Empty>	0	5	0.00	kg/d
Feed 8	<Empty>	0	5	0.00	kg/d
Feed 9	<Empty>	0	20	0.00	kg/d
Feed 10	<Empty>	0	20	0.00	kg/d
Feed ingredient intake, as fed				29,20	kg/d

Admin

### Dairy Cow Ration Calculation

Calculate ration

Needs	Intake	
Energy	94	99 MJ/d
Crude Protein	2,16	2,12 kg/d
Ca	108	12,85 g/d
P	54	52,09 g/d
Max intake	13,5	9,48 kg DM/d
NDF min	30	41,58 % DM
Concentrate max	50	49,37 % DM

Feed Cost (/d)	48,00	Ration price (/kg)	1,64
MIFC (/d)	60,00		

Print Quit



## 3.2 Least cost ration formulation

- Now you have tried to find a solution manually, write down your result (ration price, feed cost, and intake values).
- Click on the « Calculate ration » button
- Compare the results

**Solution from program is cheaper !**

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | **Ration calculation** | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake
Feed 1	Fresh grass	0.25	99	30.66 kg/d
Feed 2	Rice bran A	5	5	0.00 kg/d
Feed 3	Soybean cake	10	2.5	2.03 kg/d
Feed 4	Brewers grain	4	3	3.00 kg/d
Feed 5	<Empty>	0	3	0.00 kg/d
Feed 6	<Empty>	0	2	0.00 kg/d
Feed 7	<Empty>	0	5	0.00 kg/d
Feed 8	<Empty>	0	5	0.00 kg/d
Feed 9	<Empty>	0	20	0.00 kg/d
Feed 10	<Empty>	0	20	0.00 kg/d
Feed ingredient intake, as fed				35.69 kg/d

**Dairy Cow Ration Calculation**

Calculate ration

Needs	Intake
Energy	94
Crude Protein	2.16
Ca	108
P	54
Max intake	13.5
NDF min	30
Concentrate max	50

Needs	Intake
Energy	99 MJ/d
Crude Protein	2.16 kg/d
Ca	13.61 g/d
P	26.29 g/d
Max intake	10.36 kg DM/d
NDF min	48.31 % DM
Concentrate max	40.81 % DM

Feed Cost (/d) 39.97

MIFC (/d) 68.04

Ration price (/kg) 1.12

Admin Print Quit



## 3.2 Least cost ration formulation

Attention !

The program's priority is to find a solution where all requirements are met. This solution might not be easy to implement. Ingredients values can be slightly changed without risk. Keep in mind that formulation is always approximative. Why ?

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | Ration calculation | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake
Feed 1	Fresh grass	0.25	99	30.66 kg/d
Feed 2	Rice bran A	5	5	0.00 kg/d
Feed 3	Soybean cake	10	2.5	2.03 kg/d
Feed 4	Brewers grain	4	3	3.00 kg/d
Feed 5	<Empty>	0	3	0.00 kg/d
Feed 6	<Empty>	0	2	0.00 kg/d
Feed 7	<Empty>	0	5	0.00 kg/d
Feed 8	<Empty>	0	5	0.00 kg/d
Feed 9	<Empty>	0	20	0.00 kg/d
Feed 10	<Empty>	0	20	0.00 kg/d
Feed ingredient intake, as fed				35.69 kg/d

Calculate ration

Needs

Energy	94	99 MJ/d
Crude Protein	2.16	2.16 kg/d
Ca	108	13.61 g/d
P	54	26.29 g/d
Max intake	13.5	10.36 kg DM/d
NDF min	30	48.31 % DM
Concentrate max	50	40.81 % DM

Intake

Feed Cost (/d)	39.97
MIFC (/d)	68.04
Ration price (/kg)	1.12

Admin | Print | Quit





## 3.2 Least cost ration formulation

- Because of sampling method (is my sample representative of my ingredient ?)
- Because of analysis variations (are the results I got really trustable ?)
- Because of the algorithm chosen to solve the problem (program finds a solution among many others possibilities)

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | Ration calculation | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake
Feed 1	Fresh grass	0.25	99	30.66 kg/d
Feed 2	Rice bran A	5	5	0.00 kg/d
Feed 3	Soybean cake	10	2.5	2.03 kg/d
Feed 4	Brewers grain	4	3	3.00 kg/d
Feed 5	<Empty>	0	3	0.00 kg/d
Feed 6	<Empty>	0	2	0.00 kg/d
Feed 7	<Empty>	0	5	0.00 kg/d
Feed 8	<Empty>	0	5	0.00 kg/d
Feed 9	<Empty>	0	20	0.00 kg/d
Feed 10	<Empty>	0	20	0.00 kg/d
Feed ingredient intake, as fed				35.69 kg/d

Calculate ration

Needs

Energy	94	99 MJ/d
Crude Protein	2.16	2.16 kg/d
Ca	108	13.61 g/d
P	54	26.29 g/d
Max intake	13.5	10.36 kg DM/d
NDF min	30	48.31 % DM
Concentrate max	50	40.81 % DM

Feed Cost (/d) 39.97

MIFC (/d) 68.04

Ration price (/kg) 1.12

Admin Print Quit



## 3.2 Least cost ration formulation

So that is why manual user  
intervention is essential even if the  
program has found an optimal  
solution.

Try to find an even cheaper solution  
that might be acceptable on  
nutritional aspects.

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | Ration calculation | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake
Feed 1	Fresh grass	0.25	99	30.66 kg/d
Feed 2	Rice bran A	5	5	0.00 kg/d
Feed 3	Soybean cake	10	2.5	2.03 kg/d
Feed 4	Brewers grain	4	3	3.00 kg/d
Feed 5	<Empty>	0	3	0.00 kg/d
Feed 6	<Empty>	0	2	0.00 kg/d
Feed 7	<Empty>	0	5	0.00 kg/d
Feed 8	<Empty>	0	5	0.00 kg/d
Feed 9	<Empty>	0	20	0.00 kg/d
Feed 10	<Empty>	0	20	0.00 kg/d
Feed ingredient intake, as fed				35.69 kg/d

Calculate ration

Needs

Energy	94	99 MJ/d
Crude Protein	2.16	2.16 kg/d
Ca	108	13.61 g/d
P	54	26.29 g/d
Max intake	13.5	10.36 kg DM/d
NDF min	30	48.31 % DM
Concentrate max	50	40.81 % DM

Intake

Feed Cost (/d)	39.97
MIFC (/d)	68.04
Ration price (/kg)	1.12

Admin | Print | Quit

## 3.2 Least cost ration formulation

Change manually the quantity of fresh grass from 30.66 to 30 and quantities of soybean cake from 2.02 to 2 :

- Feed cost is cheaper
- MIFC is higher
- The mix is easier to implement
- And protein value is very close to the requirement (2.13 instead of 2.16 kg/day) so won't impact the milk production

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | Ration calculation | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0.25	99	30	kg/d
Feed 2	Rice bran A	5	5	0.00	kg/d
Feed 3	Soybean cake	10	2.5	2	kg/d
Feed 4	Brewers grain	4	3	3.00	kg/d
Feed 5	<Empty>	0	3	0.00	kg/d
Feed 6	<Empty>	0	2	0.00	kg/d
Feed 7	<Empty>	0	5	0.00	kg/d
Feed 8	<Empty>	0	5	0.00	kg/d
Feed 9	<Empty>	0	20	0.00	kg/d
Feed 10	<Empty>	0	20	0.00	kg/d
				Feed ingredient intake, as fed	35.00 kg/d

Admin

### Dairy Cow Ration Calculation

Calculate ration

Needs		Intake		
Energy	94	97		MJ/d
Crude Protein	2.16	2.13		kg/d
Ca	108	13.50		g/d
P	54	26.10		g/d
Max intake	13.5	10.20		kg DM/d
NDF min	30	48.24		% DM
Concentrate max	50	41.18		% DM

Feed Cost (/d)	39.50	Ration price (/kg)	1.13
MIFC (/d)	68.50		

Print Quit





## 3.3 Calcium and phosphorus

- Select a source of calcium and/or phosphorus as an ingredient if the intake does not meet the need

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | Ration calculation | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0.25	99	30	kg/d
Feed 2	Rice bran A	5	5	0.00	kg/d
Feed 3	Soybean cake	10	2.5	2	kg/d
Feed 4	Brewers grain	4	3	3.00	kg/d
Feed 5	Di-calcium phosphate	5	3	0.00	kg/d
Feed 6	<Empty>	0	2	0.00	kg/d
Feed 7	<Empty>	0	5	0.00	kg/d
Feed 8	<Empty>	0	5	0.00	kg/d
Feed 9	<Empty>	0	20	0.00	kg/d
Feed 10	<Empty>	0	20	0.00	kg/d
Feed ingredient intake, as fed				35.00	kg/d

Admin

### Dairy Cow Ration Calculation

Calculate ration

Needs		Intake	
Energy	94	97	MJ/d
Crude Protein	2.16	2.13	kg/d
Ca	108	13.50	g/d
P	54	26.10	g/d
Max intake	13.5	10.20	kg DM/d
NDF min	30	48.24	% DM
Concentrate max	50	41.18	% DM

Feed Cost (/d)	39.50	Ration price (/kg)	1.13
MIFC (/d)	68.50		

Print Quit

## 3.3 Calcium and phosphorus

- Select a source of calcium and/or phosphorus as an ingredient if the intake does not meet the need
- Adjust manually the quantity of the ingredient so intake of calcium or phosphorus meets the need.

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | Ration calculation | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0.25	99	30	kg/d
Feed 2	Rice bran A	5	5	0.00	kg/d
Feed 3	Soybean cake	10	2.5	2	kg/d
Feed 4	Brewers grain	4	3	3.00	kg/d
Feed 5	Di-calcium phosphate	5	3	0.4	kg/d
Feed 6	<Empty>	0	2	0.00	kg/d
Feed 7	<Empty>	0	5	0.00	kg/d
Feed 8	<Empty>	0	5	0.00	kg/d
Feed 9	<Empty>	0	20	0.00	kg/d
Feed 10	<Empty>	0	20	0.00	kg/d
Feed ingredient intake, as fed				35.40	kg/d

Admin

### Dairy Cow Ration Calculation

Calculate ration

Needs		Intake	
Energy	94	97	MJ/d
Crude Protein	2.16	2.13	kg/d
Ca	108	103.20	g/d
P	54	96.30	g/d
Max intake	13.5	10.59	kg DM/d
NDF min	30	46.46	% DM
Concentrate max	50	39.66	% DM

Feed Cost (/d)	41.50	Ration price (/kg)	1.17
MIFC (/d)	66.50		

Print Quit



### 3.3 Calcium and phosphorus

- Select a source of calcium and/or phosphorus as an ingredient if the intake does not meet the need
- Adjust manually the quantity of the ingredient so intake of calcium or phosphorus meets the need.

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | **Ration calculation** | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0.25	99	30	kg/d
Feed 2	Rice bran A	5	5	0.00	kg/d
Feed 3	Soybean cake	10	2.5	2	kg/d
Feed 4	Brewers grain	4	3	3.00	kg/d
Feed 5	Di-calcium phosphate	5	3	0.4	kg/d
Feed 6	<Empty>	0	2	0.00	kg/d
Feed 7	<Empty>	0	5	0.00	kg/d
Feed 8	<Empty>	0	5	0.00	kg/d
Feed 9	<Empty>	0	20	0.00	kg/d
Feed 10	<Empty>	0	20	0.00	kg/d
Feed ingredient intake, as fed				35.40	kg/d

Admin

### Dairy Cow Ration Calculation

Calculate ration

Needs		Intake	
Energy	94	97	MJ/d
Crude Protein	2.16	2.13	kg/d
Ca	108	103.20	g/d
P	54	96.30	g/d
Max intake	13.5	10.59	kg DM/d
NDF min	30	46.46	% DM
Concentrate max	50	39.66	% DM

Feed Cost (/d)	41.50	Ration price (/kg)	1.17
MIFC (/d)	66.50		

Print Quit

*In our example our source of Ca and P (di-calcium phosphate) make it impossible to meet needs without causing excess of phosphorus which may alter metabolism, fertility and pollution in excretions. We should try to find a source of calcium that doesn't contain phosphorus.*



## 3.4 Practice !

Change parameters (cow data, ingredients, prices, milk return) and see how it affects the calculation.

Try to modify parameter one by one to be able to see how it impacts the ration.

FAO Ration Tool

Food and Agriculture Organization  
of the United Nations

Cow data | **Ration calculation** | Milk Income less Feed Cost (MIFC) | Acknowledgment

	Ingredient name	Price (/kg)	Max (kg/d)	Fresh feed intake	
Feed 1	Fresh grass	0.25	99	30	kg/d
Feed 2	Rice bran A	5	5	0.00	kg/d
Feed 3	Soybean cake	10	2.5	2	kg/d
Feed 4	Brewers grain	4	3	3.00	kg/d
Feed 5	Di-calcium phosphate	5	3	0.4	kg/d
Feed 6	<Empty>	0	2	0.00	kg/d
Feed 7	<Empty>	0	5	0.00	kg/d
Feed 8	<Empty>	0	5	0.00	kg/d
Feed 9	<Empty>	0	20	0.00	kg/d
Feed 10	<Empty>	0	20	0.00	kg/d
Feed ingredient intake, as fed				35.40	kg/d

**Dairy Cow Ration Calculation**

Calculate ration

Needs		Intake	
Energy	94	97	MJ/d
Crude Protein	2.16	2.13	kg/d
Ca	108	103.20	g/d
P	54	96.30	g/d
Max intake	13.5	10.59	kg DM/d
NDF min	30	46.46	% DM
Concentrate max	50	39.66	% DM

Feed Cost (/d)	41.50	Ration price (/kg)	1.17
MIFC (/d)	66.50		

Admin Print Quit

## 4. Caution !

- Never elaborate rations directly from the Excel file, only the use user form !
- Program would not work properly on old version of Excel and is optimized for 2016 version of Excel.
- In the Excel file, in the feed database, do not change the « <Empty> » row nor any element of it
- As an administrator, do not modify yellow cells in the Excel file if you are not sure what you are doing
- Always keep a backup of the file
- Do not hesitate to contact administrator or the resource person and report any bug in order to improve the program.
- Some caution points are also listed within the presentation (previous slides), keep those in mind as well