

## 20. Active database

In the first versions of *OptiFeed* (i.e. To 1.0.2.5 inclusive), in adding a new ingredient we had to manually specify the content of each nutrient. In order to speed up and facilitate this process in some cases, we could add a copy of existing ingredient and modify the contents of selected nutrients alone. However, as we know, the levels of certain nutrients are interrelated. For example, electrolytes balance (cation-anion) is a derivative of sodium, potassium, and chlorine content. Thus, by changing sodium content we would have to remember to calculate and update this balance.

In version 1.0.2.6 we have made a big step forward by introducing into *OptiFeed* program the so-called *active database*. Based on the principle that the levels of certain nutrients are linked to each other, based on professional literature in the field of animal nutrition, we have developed series of models (including regression equations) that take into consideration these relationships. We have provided these formulas in *OptiFeed* all current and future users of the program. Thanks to addition and modification of ingredients, it is much faster, easier and less error-prone.































We shall illustrate the operation of active database by example. Let's try to add a new version of wheat. To this end, on the *Ingredients* tab, we click ingredient [#310] *Wheat* using the right mouse button and invoke *Create copy of ingredient* command:

The screenshot shows the OptiFeed PRO software interface. The 'Ingredients' tab is active, displaying a list of ingredients under the category 'Cereal - grains and middlings'. A context menu is open over the ingredient '[#310] Wheat', with the 'Create copy of ingredient' option highlighted. The background shows a list of ingredients with their prices and nutrient dependency symbols.

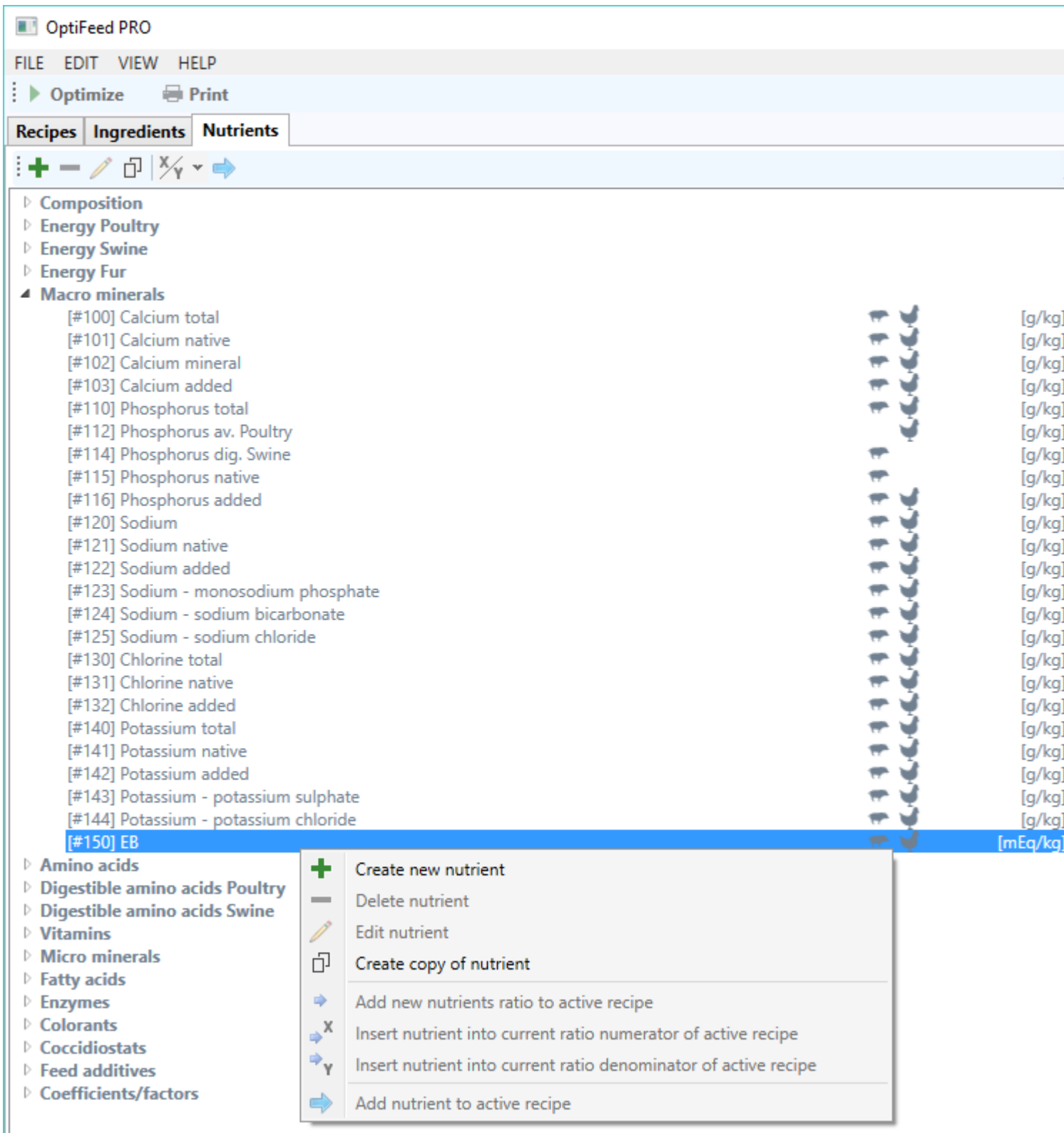
Ingredient	Price (€/t)
[#310] Wheat	580,00
[#315] Wheat extruded	800,00
[#317] Cooked wheat	700,00
[#319] Wheat, cooked middlings	600,00
[#330] Maize 8%	600,00
[#340] Maize 9%	600,00
[#345] Corn cooked	600,00
[#350] Triticale	600,00
[#370] Barley	550,00
[#375] Cooked barley	550,00
[#390] Oats	700,00
[#395] Oats cooked	450,00
[#410] Rye	600,00
[#430] Sorghum	400,00
[#440] Rice, brown	800,00
Protein plants	900,00

In response to *OptiFeed*, we open a window *Ingredient*. We concentrate on the lower parts, i.e. on the nutrients contents table. In some lines, e.g. in the #150 *EB* a symbol appears on column *Content*. This indicates that the content of the nutrient is calculated automatically by the program using the data from active database so-called **Dependency**:

Nutrients contents:

Code ▲	Nutrient		Content
#120	Sodium	 	$f_x$ 0,10 g/kg ^
#121	Sodium native	 	0,10 g/kg
#122	Sodium added	 	$f_x$ 0,00 g/kg
#123	Sodium - monosodium phosphate	 	0,00 g/kg
#124	Sodium - sodium bicarbonate	 	0,00 g/kg
#125	Sodium - sodium chloride	 	0,00 g/kg
#130	Chlorine total	 	$f_x$ 0,40 g/kg
#131	Chlorine native	 	0,40 g/kg
#132	Chlorine added	 	0,00 g/kg
#140	Potassium total	 	$f_x$ 4,10 g/kg
#141	Potassium native	 	4,10 g/kg
#142	Potassium added	 	$f_x$ 0,00 g/kg
#143	Potassium - potassium sulphate	 	0,00 g/kg
#144	Potassium - potassium chloride	 	0,00 g/kg
#150	EB	 	$f_x$ 97,92 mEq/kg v

In order to preview these relationships, we delete add new wheat (we shall get to it in a moment) and move to the *Nutrients* tab. As the edition depending of the sample program nutrients (i.e., those whose codes begin with a # sign) is possible only in the PRO version, while working on DEMO/EDU/FARMER we need to "cheat" program, by suggesting to it that we want to add a copy of nutrient #150 *EB*. To this end, we click using right mouse button and call *Create copy of nutrient* command:



In response, *OptiFeed* opens a window where you can preview the pattern on the balance. It has the following form:

#150 EB =

$$\begin{aligned}
 &434,740000 * [#120] \text{ Sodium} \\
 &/ 10,000000 \\
 &+ 255,740000 * [#140] \text{ Potassium total} \\
 &/ 10,000000 \\
 &- 282,060000 * [#130] \text{ Chlorine total} \\
 &/ 10,000000
 \end{aligned}$$

Repeating this process for the nutrients: #120 Sodium, #140 Potassium total, and #130 Chlorine total it turns out that they too are calculated from the simple dependence of the form:

#120 Sodium =

[#121] Sodium native  
+ [#122] Sodium added

#140 Potassium total =

[#141] Potassium native  
+ [#142] Potassium added

#130 Chlorine total =

[#131] Chlorine native  
+ [#132] Chlorine added

(A discerning reader will notice that the nutrients, #122 Sodium added as well as #142 Potassium added are also calculated from the dependencies, but on the basis of the nutrients available only in the PRO version, therefore, we shall ignore them here).

Upon knowing the form of these dependencies, we repeat the attempt to add a new version of wheat as shown at the beginning of this example. Now, we increase the level of sodium native (#121) from 0.10 to 0.20 g/kg. We notice that, in response, OptiFeed automatically calculated the new sodium content (#120) and EB (#150):































Nutrients contents:

Code ▲	Nutrient		Content
#120	Sodium	$f_x$	0,20 g/kg
#121	Sodium native		0,20 g/kg
#122	Sodium added	$f_x$	0,00 g/kg
#123	Sodium - monosodium phosphate		0,00 g/kg
#124	Sodium - sodium bicarbonate		0,00 g/kg
#125	Sodium - sodium chloride		0,00 g/kg
#130	Chlorine total	$f_x$	0,40 g/kg
#131	Chlorine native		0,40 g/kg
#132	Chlorine added		0,00 g/kg
#140	Potassium total	$f_x$	4,10 g/kg
#141	Potassium native		4,10 g/kg
#142	Potassium added	$f_x$	0,00 g/kg
#143	Potassium - potassium sulphate		0,00 g/kg
#144	Potassium - potassium chloride		0,00 g/kg
#150	EB	$f_x$	102,27 mEq/kg

Let's focus for a moment on the *Content* column. There is no symbol in many lines, for example for sodium added #122. As might easily be guessed these are ingredients for which no dependencies have been defined (or for which dependencies have defined, but are off – more on this at the of this article).

What to do in a situation where we do not want the program to calculate nutrient content of the dependency? We simply enter it. Let us do so for sodium (#120)- we enter "0.30":































Nutrients contents:

Code ▲	Nutrient		Content
#120	Sodium	 	$f_x$ 0,30 g/kg
#121	Sodium native	 	0,20 g/kg
#122	Sodium added	 	$f_x$ 0,00 g/kg
#123	Sodium - monosodium phosphate	 	0,00 g/kg
#124	Sodium - sodium bicarbonate	 	0,00 g/kg
#125	Sodium - sodium chloride	 	0,00 g/kg
#130	Chlorine total	 	$f_x$ 0,40 g/kg
#131	Chlorine native	 	0,40 g/kg
#132	Chlorine added	 	0,00 g/kg
#140	Potassium total	 	$f_x$ 4,10 g/kg
#141	Potassium native	 	4,10 g/kg
#142	Potassium added	 	$f_x$ 0,00 g/kg
#143	Potassium - potassium sulphate	 	0,00 g/kg
#144	Potassium - potassium chloride	 	0,00 g/kg
#150	EB	 	$f_x$ 106,61 mEq/kg































It is worth noticing that the symbol has changed its color to gray. This means that for a given nutrient, its dependency was defined, we we don't want to use them in a given ingredient – we prefer own value.

How do we return to the values calculated from the dependencies? Simply click with the right mouse button on empty field in a cell and select *Set calculated value* command:

Nutrients contents:































Code ▲	Nutrient		Content
#120	Sodium	 	$f_x$ 0,30 g/kg
#121	Sodium native	 	0,20 g/kg
#122	Sodium added	 	$f_x$ 0,00 g/kg
#123	Sodium - monosodium phosphate	 	0,00 g/kg
#124	Sodium - sodium bicarbonate	 	0,00 g/kg
#125	Sodium - sodium chloride	 	0,00 g/kg
#130	Chlorine total	 	$f_x$ 0,40 g/kg
#131	Chlorine native	 	0,40 g/kg
#132	Chlorine added	 	0,00 g/kg
#140	Potassium total	 	$f_x$ 4,10 g/kg
#141	Potassium native	 	4,10 g/kg
#142	Potassium added	 	$f_x$ 0,00 g/kg
#143	Potassium - potassium sulphate	 	0,00 g/kg
#144	Potassium - potassium chloride	 	0,00 g/kg
#150	EB	 	$f_x$ 106,61 mEq/kg

Nutrients contents:































Code ▲	Nutrient		Content
#120	Sodium	 	<i>f<sub>x</sub></i> 0,20 g/kg
#121	Sodium native	 	0,20 g/kg
#122	Sodium added	 	<i>f<sub>x</sub></i> 0,00 g/kg
#123	Sodium - monosodium phosphate	 	0,00 g/kg
#124	Sodium - sodium bicarbonate	 	0,00 g/kg
#125	Sodium - sodium chloride	 	0,00 g/kg
#130	Chlorine total	 	<i>f<sub>x</sub></i> 0,40 g/kg
#131	Chlorine native	 	0,40 g/kg
#132	Chlorine added	 	0,00 g/kg
#140	Potassium total	 	<i>f<sub>x</sub></i> 4,10 g/kg
#141	Potassium native	 	4,10 g/kg
#142	Potassium added	 	<i>f<sub>x</sub></i> 0,00 g/kg
#143	Potassium - potassium sulphate	 	0,00 g/kg
#144	Potassium - potassium chloride	 	0,00 g/kg
#150	EB	 	<i>f<sub>x</sub></i> 102,27 mEq/kg

In a similar way, we can return to own values:

Nutrients contents:

































Code ▲	Nutrient		Content
#120	Sodium	 	<i>f<sub>x</sub></i> 0,20 g/kg
#121	Sodium native	 	<i>f<sub>x</sub></i> Set own value 0,20 g/kg
#122	Sodium added	 	<i>f<sub>x</sub></i> Set calculated value 0,00 g/kg
#123	Sodium - monosodium phosphate	 	0,00 g/kg
#124	Sodium - sodium bicarbonate	 	0,00 g/kg
#125	Sodium - sodium chloride	 	0,00 g/kg
#130	Chlorine total	 	<i>f<sub>x</sub></i> 0,40 g/kg
#131	Chlorine native	 	0,40 g/kg
#132	Chlorine added	 	0,00 g/kg
#140	Potassium total	 	<i>f<sub>x</sub></i> 4,10 g/kg
#141	Potassium native	 	4,10 g/kg
#142	Potassium added	 	<i>f<sub>x</sub></i> 0,00 g/kg
#143	Potassium - potassium sulphate	 	0,00 g/kg
#144	Potassium - potassium chloride	 	0,00 g/kg
#150	EB	 	<i>f<sub>x</sub></i> 102,27 mEq/kg

Nutrients contents:

Code ▲	Nutrient		Content
#120	Sodium	 	$f_x$ 0,30 g/kg
#121	Sodium native	 	0,20 g/kg
#122	Sodium added	 	$f_x$ 0,00 g/kg
#123	Sodium - monosodium phosphate	 	0,00 g/kg
#124	Sodium - sodium bicarbonate	 	0,00 g/kg
#125	Sodium - sodium chloride	 	0,00 g/kg
#130	Chlorine total	 	$f_x$ 0,40 g/kg
#131	Chlorine native	 	0,40 g/kg
#132	Chlorine added	 	0,00 g/kg
#140	Potassium total	 	$f_x$ 4,10 g/kg
#141	Potassium native	 	4,10 g/kg
#142	Potassium added	 	$f_x$ 0,00 g/kg
#143	Potassium - potassium sulphate	 	0,00 g/kg
#144	Potassium - potassium chloride	 	0,00 g/kg
#150	EB	 	$f_x$ 106,61 mEq/kg































What happens if we apply *Set calculated value* command to a nutrient for which no dependencies have been defined (or have been disabled)? Let's do this for sodium native (#121):

Nutrients contents:

Code ▲	Nutrient		Content
#120	Sodium	 	$f_x$ 0,30 g/kg
#121	Sodium native	 	0,20 g/kg
#122	Sodium added	 	$f_x$  Set own value 0,00 g/kg
#123	Sodium - monosodium phosphate	 	$f_x$  Set calculated value 0,00 g/kg
#124	Sodium - sodium bicarbonate	 	0,00 g/kg
#125	Sodium - sodium chloride	 	0,00 g/kg
#130	Chlorine total	 	$f_x$ 0,40 g/kg
#131	Chlorine native	 	0,40 g/kg
#132	Chlorine added	 	0,00 g/kg
#140	Potassium total	 	$f_x$ 4,10 g/kg
#141	Potassium native	 	4,10 g/kg
#142	Potassium added	 	$f_x$ 0,00 g/kg
#143	Potassium - potassium sulphate	 	0,00 g/kg
#144	Potassium - potassium chloride	 	0,00 g/kg
#150	EB	 	$f_x$ 106,61 mEq/kg

As we can see that symbol once again changes its color, this time to red, which signals an erroneous situation:

Nutrients contents:

Code ▲	Nutrient		Content
#120	Sodium	 	<i>fx</i> 0,30 g/kg
#121	Sodium native	 	<i>fx</i> 0,20 g/kg
#122	Sodium added	 	<i>fx</i> 0,00 g/kg
#123	Sodium - monosodium phosphate	 	0,00 g/kg
#124	Sodium - sodium bicarbonate	 	0,00 g/kg
#125	Sodium - sodium chloride	 	0,00 g/kg
#130	Chlorine total	 	<i>fx</i> 0,40 g/kg
#131	Chlorine native	 	0,40 g/kg
#132	Chlorine added	 	0,00 g/kg
#140	Potassium total	 	<i>fx</i> 4,10 g/kg
#141	Potassium native	 	4,10 g/kg
#142	Potassium added	 	<i>fx</i> 0,00 g/kg
#143	Potassium - potassium sulphate	 	0,00 g/kg
#144	Potassium - potassium chloride	 	0,00 g/kg
#150	EB	 	<i>fx</i> 106,61 mEq/kg

However, the program is able to independently extricate itself out of this situation, using its own recorded value for further calculations - in this case 0.20 g/kg.

We now fill out the missing data at the top of *Ingredient* window, i.e. the base ingredient, code and, name, for example as follows:



**Ingredient**

Group:

Base ingredient:

Code:

Name:

Price [€/t]:

Nutrients contents:

Code ▲	Nutrient		Content
#120	Sodium		<i>f<sub>x</sub></i> 0,30 g/kg
#121	Sodium native		<i>f<sub>x</sub></i> 0,20 g/kg
#122	Sodium added		<i>f<sub>x</sub></i> 0,00 g/kg
#123	Sodium - monosodium phosphate		0,00 g/kg
#124	Sodium - sodium bicarbonate		0,00 g/kg
#125	Sodium - sodium chloride		0,00 g/kg
#130	Chlorine total		<i>f<sub>x</sub></i> 0,40 g/kg
#131	Chlorine native		0,40 g/kg
#132	Chlorine added		0,00 g/kg
#140	Potassium total		<i>f<sub>x</sub></i> 4,10 g/kg
#141	Potassium native		4,10 g/kg
#142	Potassium added		<i>f<sub>x</sub></i> 0,00 g/kg
#143	Potassium - potassium sulphate		0,00 g/kg
#144	Potassium - potassium chloride		0,00 g/kg
#150	EB		<i>f<sub>x</sub></i> 106,61 mEq/kg

and we confirm adding of a new version of wheat by pressing << OK >> button.

We notice that the same symbols as in *Ingredient* window appear on *Ingredients* tab of the main program window:

OptiFeed PRO

FILE EDIT VIEW HELP

Optimize Print

Recipes Ingredients Nutrients

Cereal - grains and middlings

- [#310] Wheat 580,00 €/t
  - [3] Wheat 2016 580,00 €/t
  - [#320] Wheat (ENZ) 580,00 €/t
  - [#315] Wheat extruded 800,00 €/t
  - [#317] Cooked wheat 700,00 €/t
  - [#319] Wheat, cooked middlings 600,00 €/t
  - [#330] Maize 8% 600,00 €/t
  - [#340] Maize 9% 600,00 €/t
  - [#345] Corn cooked 600,00 €/t

Code ^	Nutrient		Content
#120	Sodium		$f_x$ 0,30 g/kg
#121	Sodium native		$f_x$ 0,20 g/kg
#122	Sodium added		$f_x$ 0,00 g/kg
#123	Sodium - monosodium phosphate		0,00 g/kg
#124	Sodium - sodium bicarbonate		0,00 g/kg
#125	Sodium - sodium chloride		0,00 g/kg
#130	Chlorine total		$f_x$ 0,40 g/kg
#131	Chlorine native		0,40 g/kg
#132	Chlorine added		0,00 g/kg
#140	Potassium total		$f_x$ 4,10 g/kg
#141	Potassium native		4,10 g/kg
#142	Potassium added		$f_x$ 0,00 g/kg
#143	Potassium - potassium sulphate		0,00 g/kg
#144	Potassium - potassium chloride		0,00 g/kg
#150	EB		$f_x$ 106,61 mEq/kg

As we know, we can also edit from the level of table the nutrients contents in the ingredients. However, for this purpose we need to open a separate window, for example by double-clicking a line using left mouse button. Let's do it for sodium (#120):

Nutrient content

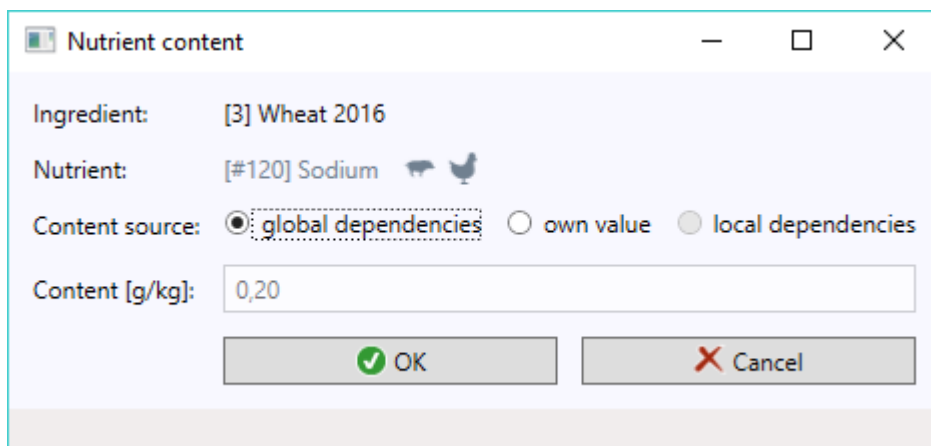
Ingredient: [3] Wheat 2016

Nutrient: [#120] Sodium

Content source:  global dependencies  own value  local dependencies

Content [g/kg]:

Now let us consider the three switches located to the right of the *Content source* tag and switch them from the own values to global dependencies:



Nutrient content

Ingredient: [3] Wheat 2016

Nutrient: [#120] Sodium

Content source:  global dependencies  own value  local dependencies

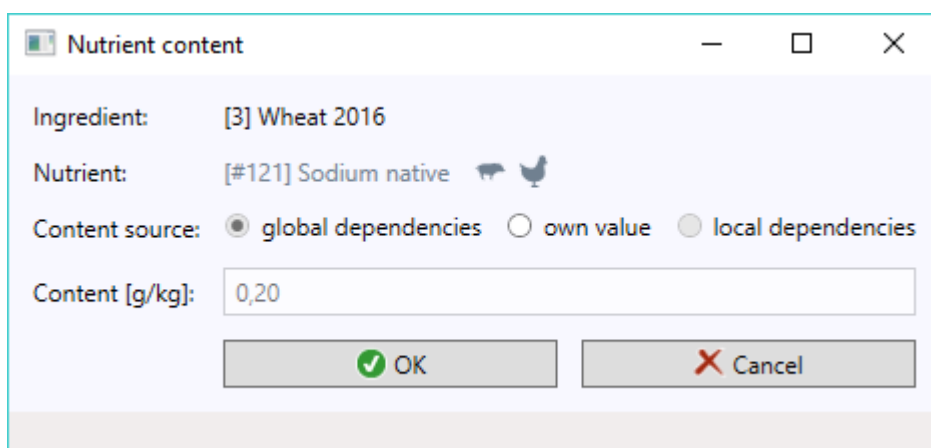
Content [g/kg]: 0,20

OK Cancel

In response, the program moved to sodium content calculated from the dependencies.

(The third switch, i.e. local dependencies, is reserved for the PRO version, where one can define dependencies specific not to the while, but to individual ingredients).

We save the changes by pressing << OK >> and - for the sake of order - we fix the source of content for sodium native (#121), by moving the switch from global dependencies (which are not there) to own value:



Nutrient content

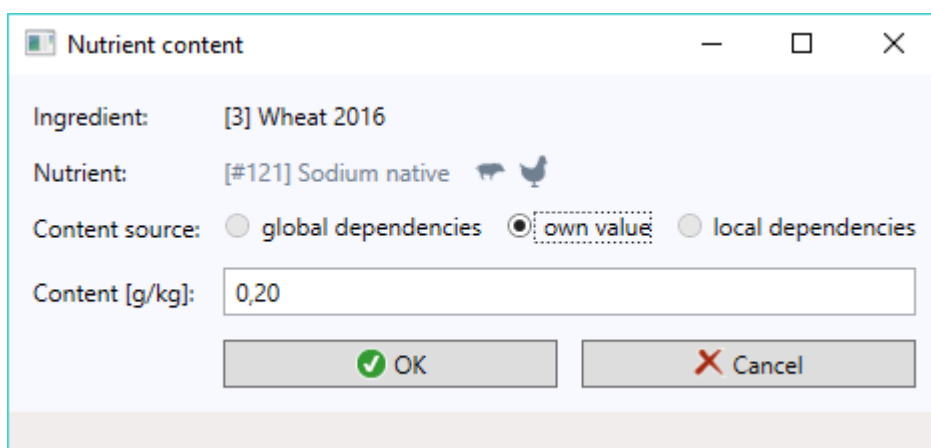
Ingredient: [3] Wheat 2016

Nutrient: [#121] Sodium native

Content source:  global dependencies  own value  local dependencies

Content [g/kg]: 0,20

OK Cancel



Nutrient content

Ingredient: [3] Wheat 2016

Nutrient: [#121] Sodium native

Content source:  global dependencies  own value  local dependencies

Content [g/kg]: 0,20

OK Cancel

After clicking << OK >>, the main program window should be presented as follows:

OptiFeed PRO

FILE EDIT VIEW HELP

Optimize Print

Recipes Ingredients **Nutrients**

+ - ✎ □ ↻ ↺ ↻

▲ Cereal - grains and middlings

- ▲ [#310] Wheat
  - [3] Wheat 2016** 580,00 €/t
  - [#320] Wheat (ENZ) 580,00 €/t
  - [#315] Wheat extruded 800,00 €/t
  - [#317] Cooked wheat 700,00 €/t
  - [#319] Wheat, cooked middlings 600,00 €/t
  - [#330] Maize 8% 600,00 €/t
  - [#340] Maize 9% 600,00 €/t
  - [#345] Corn cooked 600,00 €/t

☰ ☒ ✂ ↻ ↺ ↻

Code ▲	Nutrient		Content
#120	Sodium	☒ ☒	$f_x$ 0,20 g/kg
#121	Sodium native	☒ ☒	0,20 g/kg
#122	Sodium added	☒ ☒	$f_x$ 0,00 g/kg
#123	Sodium - monosodium phosphate	☒ ☒	0,00 g/kg
#124	Sodium - sodium bicarbonate	☒ ☒	0,00 g/kg
#125	Sodium - sodium chloride	☒ ☒	0,00 g/kg
#130	Chlorine total	☒ ☒	$f_x$ 0,40 g/kg
#131	Chlorine native	☒ ☒	0,40 g/kg
#132	Chlorine added	☒ ☒	0,00 g/kg
#140	Potassium total	☒ ☒	$f_x$ 4,10 g/kg
#141	Potassium native	☒ ☒	4,10 g/kg
#142	Potassium added	☒ ☒	$f_x$ 0,00 g/kg
#143	Potassium - potassium sulphate	☒ ☒	0,00 g/kg
#144	Potassium - potassium chloride	☒ ☒	0,00 g/kg
#150	EB	☒ ☒	$f_x$ 102,27 mEq/kg

Lastly, let us once more return for a moment to the nutrients and their dependencies. To do this end, let's move to *Nutrients* tab and create a copy of nutrient #150 EB:

Nutrient

Group: Macro minerals

Code: 1

Name: EB

Unit: mEq/kg

Dependent on dry matter:

Dependencies

off  program  own

434,740000 \* [#120] Sodium  
/ 10,000000  
+ 255,740000 \* [#140] Potassium total  
/ 10,000000  
- 282,060000 \* [#130] Chlorine total  
/ 10,000000

OK Cancel

Let's concentrate on the three switches from *Dependencies* frame. At this point the position *own (dependencies)* is on, as own nutrients may have own dependencies alone (or off - first switch). In contrast, program dependencies (second switch) are reserved for program nutrients (i.e. those with codes starting with # sign), which (only in PRO version) may also have own dependencies (and local, that is, for a single ingredient).

A switch is entitled *Dependent on dry matter* is over the *Dependencies* frame. It is connected with a specific nutrient with a code #2 and the name *Dry matter*. If as part of editing of an ingredient (in the *Ingredient* or *Nutrient content* window) we change its contents, then the program, upon clicking << OK >> button asks whether to automatically recalculate the own contents of the remaining nutrients dependent on dry matter:

Dry matter

Dry matter content has changed. Do you want the program to recalculate own contents of dry matter dependent nutrients?

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It should be noted that this is about own contents, but not contents calculated from the dependencies, which are converted on an ongoing basis in the *Ingredient* window. Furthermore, if the answer to the raised question is in the affirmative, only the nutrients we had marked in *Nutrient* window as *dependent on dry matter* will be converted:

The screenshot shows a window titled "Nutrient" with standard window controls (minimize, maximize, close). The form contains the following fields:

- Group: A dropdown menu with "Macro minerals" selected.
- Code: A text input field containing "1".
- Name: A text input field containing "EB".
- Unit: A dropdown menu with "mEq/kg" selected.
- Dependent on dry matter: A checkbox that is checked.

In order for a nutrient to be considered dependent on dry matter, this box must be checked (as above). Alternatively, this box might be left in the indefinite state:

This screenshot is identical to the one above, but the "Dependent on dry matter" checkbox is unchecked. The checkbox is shown as a small square followed by a dotted rectangular box, indicating an indefinite state.

Then about a nutrient's unit shall determine whether the program treat it as dependent on dry matter or not. The program shall consider all nutrients of any unit other than "%" and "no unit" as dependent on dry matter.