



Feeding Software PC Program

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The Vaki feeding system:

Vaki feeding system is automatic feeding system designed for Fish Farms. The system utilizes one or more feed storage silos, which is useful when different sized feed is used. The main parts of the system are controlled augers, air lock, funnel, motor, blower, a rotary selector valve, and pipes.

Feeding operation is based on feed from the storage silo the silo empties into a feed dosing auger. The auger moves this feed into a funnel which make sure that the feed goes to airlock and then into the main transport pipe. Air from an air blower blows into the distribution valve where it is directed into the individual feed pipes and transferred to specific tanks.

The operation of the system is controlled by Programmable Logic Controller (PLC). Programmed computer software is used to interface and program the feeding system. The system software controls feeding operation such as feed rates, meal times, feed types, etc. The operator can monitor, interface, reprogram or override the automatic operation of the system.

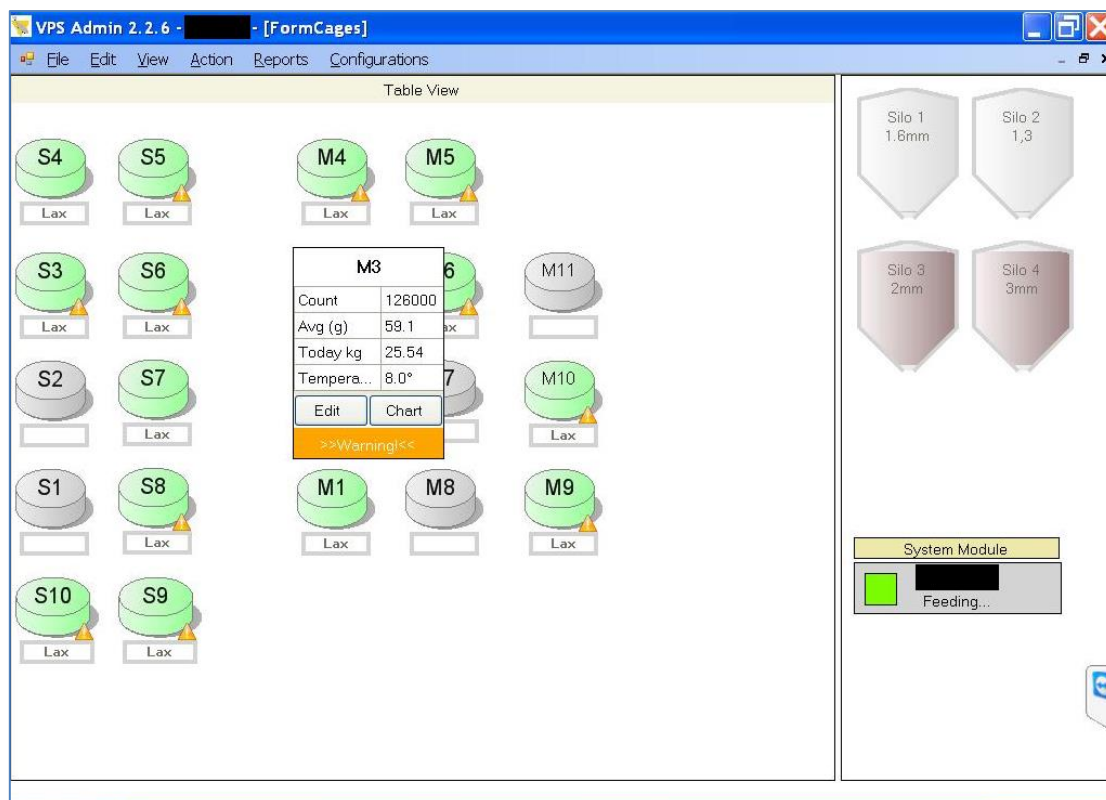
The feeding software application, *VPS_Admin*, can manage one or more Vaki feeding systems.

The feeding systems are either set up for automatic or manual mode. Hatcheries and smolt farms are set up in automatic mode. System calculates the need for food based on biomass, temperature and other factors and feed them in small dozes distributed along most of the day. For the large fish in the on sea cages the system is run in manual mode. An operator starts the feeding and keeps it on until fish has had enough and stops eating.

This manual is intended to give a good description of how the *VPS_Admin* application works, setup of the system and tech how to perform necessary tasks when working with a feeding system.

Overview

Below is the main screen of the *VPS_Admin*. The large area on the left shows icons for all cages defined in the system. In the upper right area are the silo icons, displaying proportional amount of food in each. On the lower right we have the definition for the feeding system(s) controlled by this application. In this case there is only one. The details of the menu bar at top are described in specific section.



Cages

Colour of the cages:

Green: cage is functional and has a population of fish defined.

Grey: Usually means no population/empty cage or cage defined as a raceway.

Yellow: Cage has been intentionally set inactive so it will not be fed during automatic feeding.

The rectangle at bottom of each cage displays the name set on the population it contains. As can be seen, the population names are not required to be unique. Notice also that the colour of the border on the name tag is the same as on the system module icon in the lower right – which is clarifying when multiple systems are managed from application.

Error and warning signs are displayed on the right on top of the population name tags. Error signs are red and warnings are yellow (as on picture above).

Cage popup window shows up when mouse is hovered over the cage icon and shows some basic statistics:

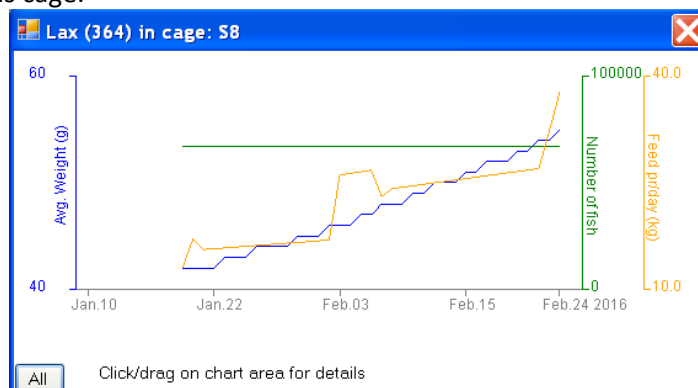
Count: Number of fish in cage

Avg (g): Average weight of fish

Today kg: Feed into cage today (updated every hour)

Temperature: Registered temperature for cage

When moving the mouse over the >>Warning<< field a description of the warning will pop up. <Edit> button brings up the population window (described later) and the <Chart> button show some historical data for this cage:



Silos

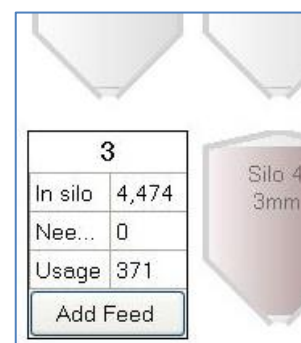
More detailed info about silo content can be accessed by hovering mouse over the silo icon:

In Silo: Current amount of feed in silo (kg)

Needed: How much feed you add to the silo so it will last the whole day. The grey colour of the silo walls/background turn yellow when this amount is none-zero

Usage: Estimated one day's usage

These information are updated on every hour when *VPS_Admin* automatically reads info from PLC machine.



Click the <Add feed> to register more feed to silo – or correct its content

System modules

The system module icons show the status on the PLC machines. Green colour on the square on the left side tells us that the serial connection to the PLC is ON. Red square means no connection.

The status strings at the bottom may be:

Retrieving data... Reading feeding data from PLC and storing into database

Writing to PLC Writing feeding setup instruction to PLC

No Connection ! Some problem in serial connection between pc machine and PLC

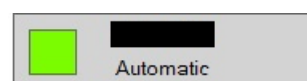
Failure: Some internal failure in the PLC

Automatic System is idle in automatic mode

Feeding... System is busy feeding in automatic mode

Manual ready System at rest in manual mode

Manual feeding... Busy feeding in manual mode



By clicking on the system module icon you bring up the control pages for that system.

Table view

Clicking the bar at the top in the cage area toggles on the table view of the cages.

Dashboard View

CageId	Chart	Edit	Descr	Error	PopN	NumF	Avg	Feed	°C	Race	Silo(s)	Food	Profile	AutoL	PopID	Cage
M1	Chart	Edit			Lax	156...	85.0	50.10	7.0°	False	4	3mm	Su...	True	371	M1
M10	Chart	Edit		Wa...	Lax	323...	129.4	212...	7.0°	False	4	3mm	Su...	True	372	M10
M11	Chart	Edit				0		0.00	7.0°	False				False		M11
M2	Chart	Edit		Wa...	Lax	136...	100.9	54.16	7.0°	False	4	3mm	Su...	True	367	M2
M3	Chart	Edit		Wa...	Lax	126...	59.1	27.86	8.0°	False	3	2mm	Su...	True	373	M3
M4	Chart	Edit		Wa...	Lax	142...	65.4	38.61	8.0°	False	4	3mm	Su...	True	350	M4
M5	Chart	Edit		Wa...	Lax	104...	72.7	35.63	8.0°	False	4	3mm	Su...	True	363	M5
M6	Chart	Edit		Wa...	Lax	154...	84.0	65.29	8.0°	False	4	3mm	Su...	True	360	M6
M7	Chart	Edit				0		0.00	7.0°	False				False		M7
M8	Chart	Edit				0		0.00	7.0°	False				False		M8
M9	Chart	Edit		Wa...	Lax	282...	163.5	267...	7.0°	False	4	3mm	Su...	True	365	M9
S1	Chart	Edit				0		0.00	8.0°	False				False		S1
S10	Chart	Edit		Wa...	Lax	137...	41.7	48.16	8.0°	False	3	2mm	Su...	True	358	S10
S2	Chart	Edit				0		0.00	8.0°	False				False		S2
S3	Chart	Edit		Wa...	Lax	741...	43.1	21.05	8.0°	False	3	2mm	Vetur	True	369	S3
S4	Chart	Edit			Lax	753...	43.1	20.28	8.0°	False	3	2mm	Vetur	True	370	S4
S5	Chart	Edit		Wa...	Lax	749...	45.9	22.60	8.0°	False	3	2mm	Vetur	True	368	S5
S6	Chart	Edit		Wa...	Lax	750...	54.0	20.28	8.0°	False	3	2mm	Vetur	True	366	S6
S7	Chart	Edit			Lax	740...	53.4	24.61	8.0°	False	3	2mm	Su...	True	362	S7
S8	Chart	Edit		Wa...	Lax	670...	55.1	25.39	8.0°	False	3	2mm	Su...	True	364	S8
S9	Chart	Edit		Wa...	Lax	104...	37.9	39.17	9.0°	False	3	2mm	Vetur	True	327	S9

Silo 1
1.6mm

Silo 2
1,3

Silo 3
2mm

Silo 4
3mm

System Module

Feeding...

In table view you get a brief overview of the statistic of all cages. Click the bar at top (now marked 'Dashboard view') to toggle on the cages view again.

Populations, edit & setup

Creating population, insert the populations name and description. In population sheet insert the Total amount of the fish and the gender of the fish. The average fish weight must be entered as well as the total feed per day (the total feed can also be calculated (see button) based on the biomass in the cage and other factors)

Check the "Auto update" for automatic update on the average weight and the daily feed amount. Those numbers are automatically updated once pr/24 hours. For the automatic calculations to work, the fields: "SGR Id", "FCR" and "Corr. factor" must be properly filled Insert appropriate SGR-Id table, FCR and Correction factor and weighted average.

Feeding info gives information of total feed into the cage today and yesterday.

Number of fish

Total: The total number of fish in the cage. When the population is created the fish is added by adding fish number in the Total box. When the total number of fish goes to zero, the current population is terminated.

(...) To change the fish number or change the gender ratio in the population press the (...) button. Then following window appears.

Add: Select type of adding or deleting fish from the cage. It is possible to choose from A (Add), H (harvest), M (Mortality).

+: insert total amount of fish that should be added or deleted from the cage. Chose opposite sign if that is needed.

Gender: If the gender is known select either male or female otherwise select unknown.

Female: Total amount of female fish in the population.

Male: Total amount of mail in the population.

Unknown: Total amount of unknown fish in the population.

Auto update: Select auto update to active the SGR field.

SGR:

SGR Id: The “SGR Id” is a name of a predefined **Specific Growth Rate** table, which is a table that specifies the growth rate based on temperature and the average fish weight in the cage.

FCR is the **Feed Conversion Ratio** defined for the species in the cage.

Corr factor is a way to increase or decrease the feed amount per day if we don't like the amount calculated “by the book” by the application. FCR=1 is neutral, but for example if FCR=1.1 the amount will be increased by 10% from the “theoretical “ amount calculated based on the SGR, FCR, biomass and temperature .

Global Correction Factor is an option set from <Configurations> -> <Options> . When that option is chosen, a small box will appear in the lower right corner on the cage area where you can set the correction factor for every cage in the system in one operation.

Feeding info

Yesterday: Total kg fed Yesterday.

Today: Total kg fed Today

Average weight: Average weight (grams) Average weight is entered here. Also corrections in average weight are entered here. You can chose which unit to use here under <Configurations> -> <Options>

Total Feed per day: Total amount of feed per day.

Calc. Feeding: Calculate feeding. Press this button to if any changes as been made in the sheet.

Active: To active feeding in the cage. Inactive when the population should be starving. Then the cage on the main screen appears to be yellow.

Total biomass: Total fish biomass in the cage.

To connect or change the feeding profile for the population, go to the profile sheet on the population window. And select the profile in the profile Id box or create a new profile for the population.

Pop Name: C1pop - (C1) Parent Population:

Description:

Population Profile [General] Cage [C1] Silo [1]

Profile Id: General Description:

Start: 00:00 End: 23:59

Bar chart showing feeding rates over 24 hours. Values range from 0.0 to 5.9.

See how to edit the profiles at: Edit -> Feeding profiles pg.14

Silo connection

The silo for the population is chosen on the silo sheet in the population window select silo. The silos are listed down the column with description of feeding type. At least one silo must be selected for the population.

Population C1pop [Origin: C1pop]

Pop Name: C1pop - (C1) Parent Population:

Description:

Population Profile [General] Cage [C1] Silo [1]

☒ Silo 1 5mm

☐ Silo 2 4mm

Move population (whole or part) between cages

We use mouse drag and drop. Let's describe it by an example. We want to move 10000 fishes from cage **C7** to the new **C9** cage. We move the mouse to the name field at the top of C7's popup and put left mouse button down there – and then drag the mouse pointer to the **C9** name. Mouse pointer should then change to a small square and the icon will jump – showing that the cage accepts a drop. With the square mouse pointer on, you release the mouse button again and a dialog will be brought up.

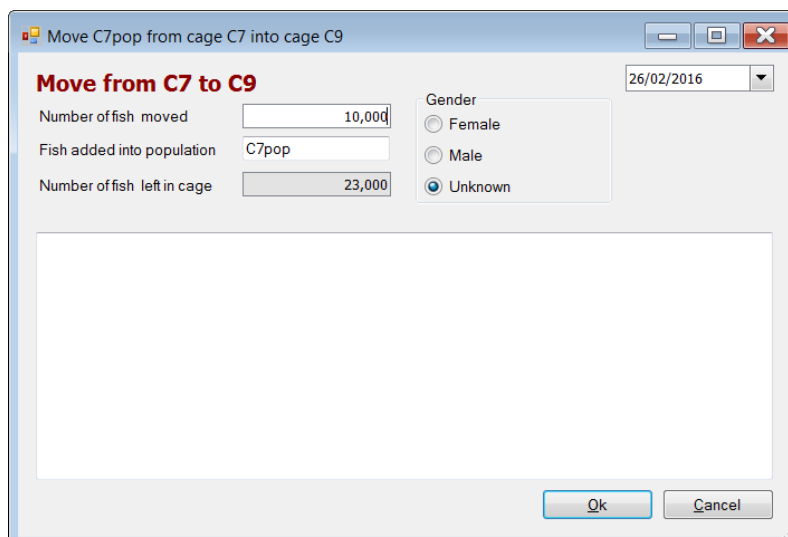
C7

Count	33000
Avg (g)	150.0
Today kg	0.00
Temperat...	8.0°

Edit Chart

Salm-01

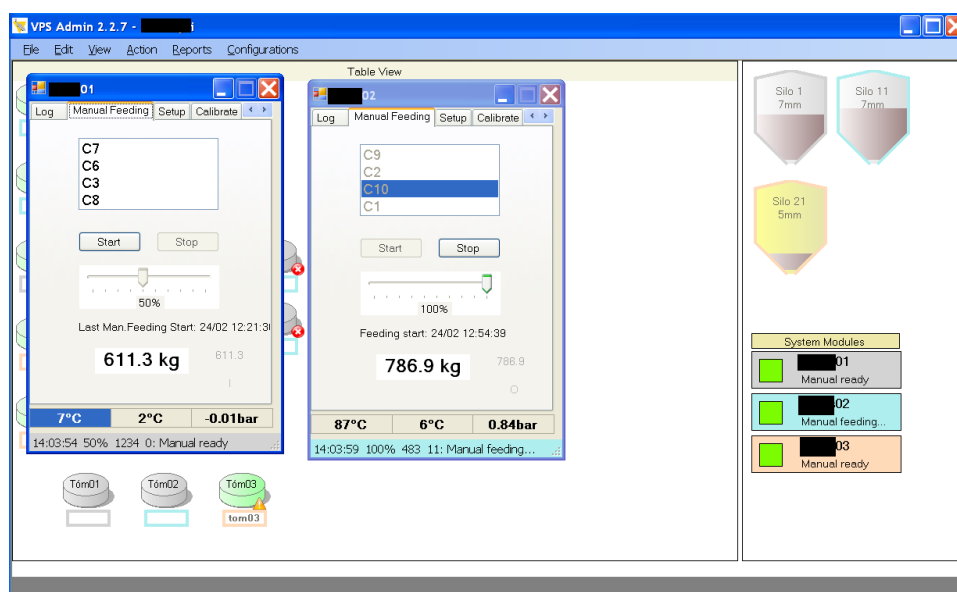
C9



You enter the number 10000 into the “Number of fish moved” field and press <OK>. And you’re done.

System modules control pages

By clicking on the system module icons, you bring up their control pages.



Above we have a setup with 3 systems for doing manual feeding. Control pages for systems 1 & 2 are open. The status strip at the bottom of each page shows status info retrieved from the PLC machine - from left: the clock, auger throughput, current encoder readout and the operation state.

The temperature and pressure number are readouts from the optional sensors attached to the feeding system (see: Configuration -> Sensors pg.22)

The manual feeding is controlled from the *Manual feeding* tab.

Other tabs are:

Log: Displays various messages from the system

Setup: Setup communication port. Here under is also the possible to test the revolver/encoder and the blower.

Calibrate: Calibrate the silo/auger discharge throughput in terms of grams pr. Second

FeedLog: Logging from the PLC of all recent feeding details in automatic mode

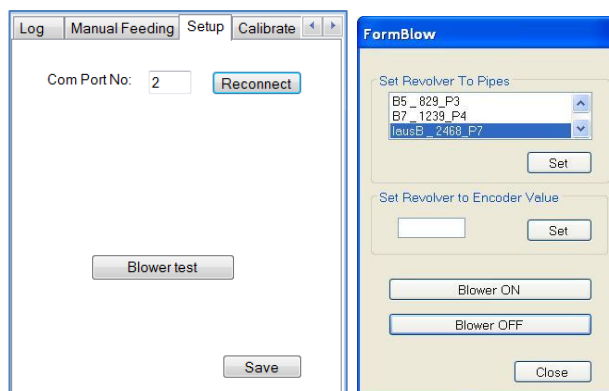
Manual feeding

Referring to the picture above with the manual feeding tabs open. To start manual feeding is so simple as select the cage to feed into in the listbox control and press the <Start> button. Augers throughput can be adjusted at any time with the throughput slider. Amount fed to cage appears in kg in the big letters at bottom of page.

To stop feeding, simply press <Stop>. The auger will stop immediately, but we have to wait some defined blow-out time before we are ready to start feeding to another cage.

Setup tab

Here we enter the serial port number to connect to the PLC machine.



Under the <Blower test> button we can run some tests on the blower and the revolver. Notice though that the state of the PLC must be “Manual ready” – otherwise access to blow test page isn’t allowed. The button will bring up the *formBlow* page on the right. You can set the revolver to specific location. In the listbox at the top all cages defined to this system are listed. There are three “pieces” of information about each cage: *CageName_EncoderPosition_PipeNumber*. You select a cage and press the <Set> button and the revolver will move to correct position to blow into the selected cage.

In the middle, you can enter any valid encoder position and press <Set> to get the revolver into that position.

By the two buttons at the bottom of page you can turn the blower on and off.

Calibrate tab

The amount of food given is controlled by time adjustments. We determine how much food we deliver from silo (by the augers in most cases) pr/time unit. The discharge speed of feed from the silo

may depend on the type of food and its character (dry/wet, sticky/loose..) and the amount in the silo (more feed in silo -> more pressure at bottom -> more discharge speed)

In short, we do like that: Run the auger for a specific amount of time. Collect the food coming from it and then put it on a scale and weight it. Then we do the math:

$$(\text{Amount in grams})/(\text{Seconds auger running}) = (\text{calibrated grams pr/ second})$$

Then we enter the resulting grams pr. Second as the calibration value.

Use	Grams Pr. Sec	Amount in Silo	Calibrate Date
<input checked="" type="checkbox"/>	136	4013	25/02/2018
<input type="checkbox"/>	172	3548	18/02/2018
<input type="checkbox"/>	183	2778	08/02/2018
<input type="checkbox"/>	193	2208	18/01/2018

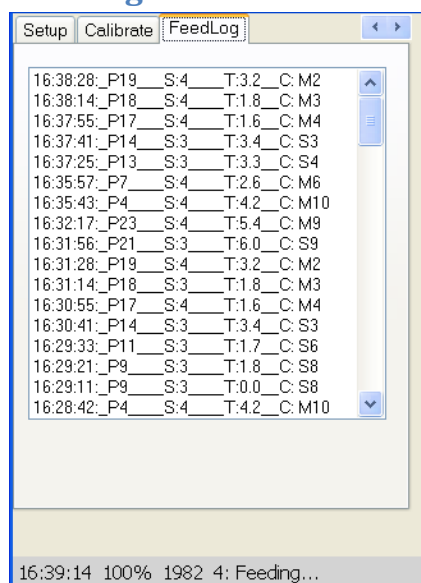
We select the silo ID number in the dropdown box.

Notice the <Run Test>. You can click that button to run the auger for a specified amount of time – but only if the status strip at the bottom of the dialog shows: “Manual ready”; there is a button on the PLC’s el-cabinet which can be used to put the PLC into that state.

After running the test and having the measurements, you enter the resulting value into the edit field and press *Save*.

As you can see we keep track of older calibrations, but only the ones who are checked in the “Use” columns are used. We can use **multipoint calibration** by selecting more than one set of calibrations. It can be good if we notice that there is some real difference on the discharge speed depending on the amount of food in the silo. In other words use calibration points with both low and high amount of food in silo. There are actually how limits on how many points are used – the system will interpolate the used calibration value depending on the amount in silo at that time.

FeedLog tab

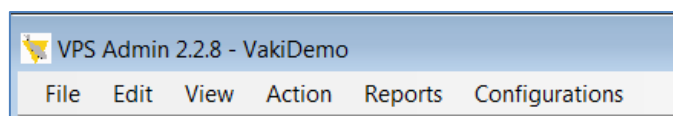


Here you can see the last 100 feeding bursts from the PLC and check if they are in accordance with your intentions. Each entry, from left:

1. Time of feeding
2. Pipe number
3. Silo number
4. Time duration of burst in seconds
5. Cage name

Menu system

This chapter goes through the menubar from left to right: File, Edit, View, Action, Configuration



File -> New -> Feed profile

An option to create new feeding profile. See profile edit section below for more details about profiles.

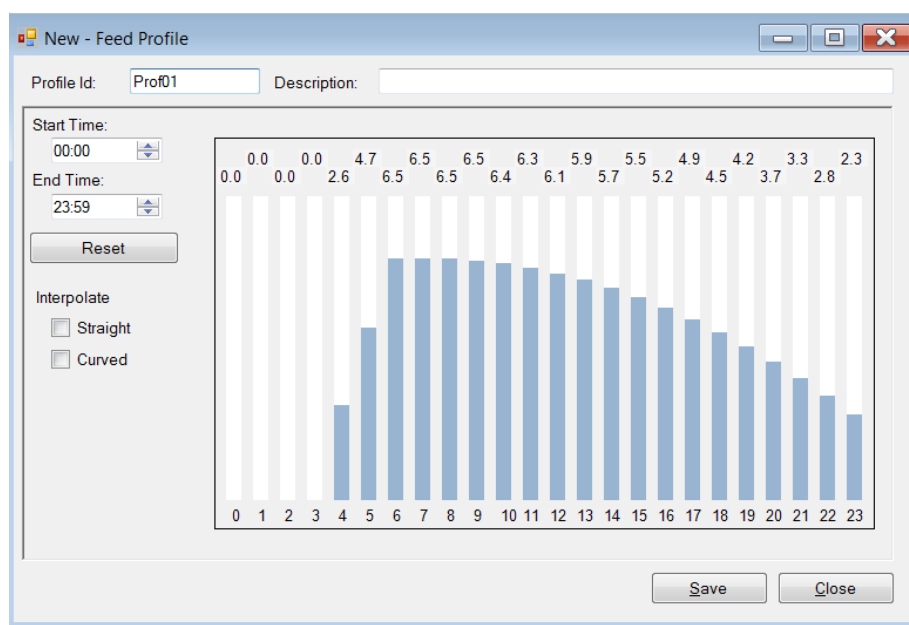
File -> Exit

Click on the exit to close the VPS program.

Edit -> Feeding profiles

The feeding profiles are presented as graphs. The feed intervals in the plan are an hour. The numbers from 1 to 23 are presented under each graph. The numbers at top are the percentage amount of the day's feeding that will be done during that specific hour.

The columns can be dragged up and down by the mouse. Curve shapes can be created by checking the *Straight & Curved* checkboxes.



Profile Id: Insert Profile name/Id for the profile.

Description: More detailed description of the profile name.

Start time/End time. Start time and end time of the feeding period. The profile feeding period is changed by choosing its time period or letting the percentages of inactive hours be 0%.

Edit -> Directories

Define directories for miscellaneous uses. See details in: System definition and application startup pg.27

Edit -> Data base

Database definition for system. See details: System definition and application startup pg.27

View -> PLC Time table

PLC Time table shows total feed per hour in each cage over one day period. Two first columns on the left side show the pipes and the cage it is connected to. The third column shows total feeding time per cage. The feeding time results are shown as time in seconds. The entries for hours 0 to 23 are values for a single feeding "shot" which needs to be multiplied by number of rounds pr/hour of encoder to get the totals

The bottom line shows how much the feed load in % per hour. **Total:** feeding time +blowing time+ time to empty pipe.

Notice that for cage C01, all times are zero because C01 has been set inactive as can be seen by its yellow colour

C01

C02

Feeding table - Time for

Pipe	Cage	Total	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	C01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	C02	1130.4	3.1	3.4	3.5	3.8	3.9	4.1	4.2	4.2	4.4	4.4	4.4	4.5	4.4	4.4	4.3	4.3	4.2	4.0	4.0	3.7	3.6	3.4	3.1	2.9
3	C03	1084.8	3.0	3.2	3.4	3.6	3.8	3.9	4.0	4.1	4.2	4.2	4.2	4.3	4.3	4.2	4.2	4.1	4.0	3.9	3.7	3.6	3.5	3.2	3.0	2.8
4	C04	374.4	1.0	1.1	1.2	1.2	1.3	1.4	1.4	1.4	1.4	1.5	1.5	1.4	1.5	1.5	1.4	1.4	1.4	1.3	1.2	1.2	1.1	1.1	0.9	0.8
5	C05	4730.4	13.1	14.1	15.0	15.7	16.4	16.9	17.5	17.9	18.2	18.4	18.5	18.6	18.5	18.4	18.2	17.9	17.4	17.0	16.4	15.7	15.0	14.1	13.1	12.2
6	C06	5052.0	14.0	15.1	15.9	16.8	17.5	18.2	18.6	19.1	19.4	19.7	19.8	19.8	19.8	19.7	19.4	19.1	18.6	18.2	17.5	16.8	15.9	15.1	14.1	12.9
7	C07	728.4	2.0	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.8	2.8	2.9	2.8	2.9	2.8	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.0	1.9	1.8
8	C08	4934.4	13.7	14.7	15.6	16.4	17.1	17.7	18.2	18.6	19.0	19.2	19.3	19.4	19.4	19.2	18.9	18.7	18.2	17.7	17.1	16.4	15.6	14.7	13.7	12.7
9	C09	1284.0	3.5	3.9	4.0	4.3	4.4	4.6	4.8	4.8	5.0	5.0	5.0	5.0	5.1	5.0	4.9	4.8	4.8	4.6	4.4	4.3	4.1	3.8	3.6	3.3
10	C10	1239.6	3.4	3.7	3.9	4.1	4.3	4.5	4.6	4.7	4.7	4.9	4.8	4.9	4.9	4.8	4.8	4.6	4.6	4.5	4.3	4.1	3.9	3.7	3.5	3.1
11	C11	1058.4	2.9	3.2	3.3	3.5	3.7	3.8	3.9	4.0	4.0	4.2	4.1	4.2	4.1	4.1	4.1	4.0	3.9	3.8	3.7	3.5	3.3	3.2	2.9	2.8
12	C12	1318.8	3.6	4.0	4.1	4.4	4.6	4.7	4.9	5.0	5.0	5.2	5.1	5.2	5.2	5.1	5.1	5.0	4.8	4.8	4.6	4.3	4.2	3.9	3.7	3.4
13	C13	474.0	0.6	0.8	0.7	0.8	0.9	1.0	1.2	1.6	2.4	2.6	2.6	2.9	2.9	2.9	2.8	2.6	2.6	2.0	1.5	1.1	0.9	0.8	0.7	0.6
14	C14	751.2	2.0	2.3	2.4	2.5	2.6	2.7	2.7	2.9	2.9	2.9	2.9	3.0	2.9	2.9	2.9	2.9	2.7	2.7	2.6	2.5	2.4	2.3	2.0	2.0
	Load in %		65.63	67.57	68.77	70.17	71.33	72.37	73.23	74.03	74.8	75.33	75.37	75.67	75.63	75.33	74.93	74.4	73.63	72.73	71.53	70.2	68.97	67.5	65.83	64.17

On certain occasions when the system is overloaded the load % at bottom might reach 100%. This means that Vaki VPS_admin will not manage to finish the feed circle over that period. Possible corrections are: Reduce feeding by decreasing activity and appetite factors. Increase/adding periods in the feeding plan. Change the physical calibration on the augers by changing the gearing from the motor.

view -> PLC Weight table:

PLC weight table shows the total weight of feed per hour in each cage over one day period. Two first columns on the left side show the pipe and the cage it is connected to. The third column shows total feed per day. Columned named 1 to 23 shows the total feed (kg) per hour of the day in each cage. Total feed in each hour can be seen in the bottom line.

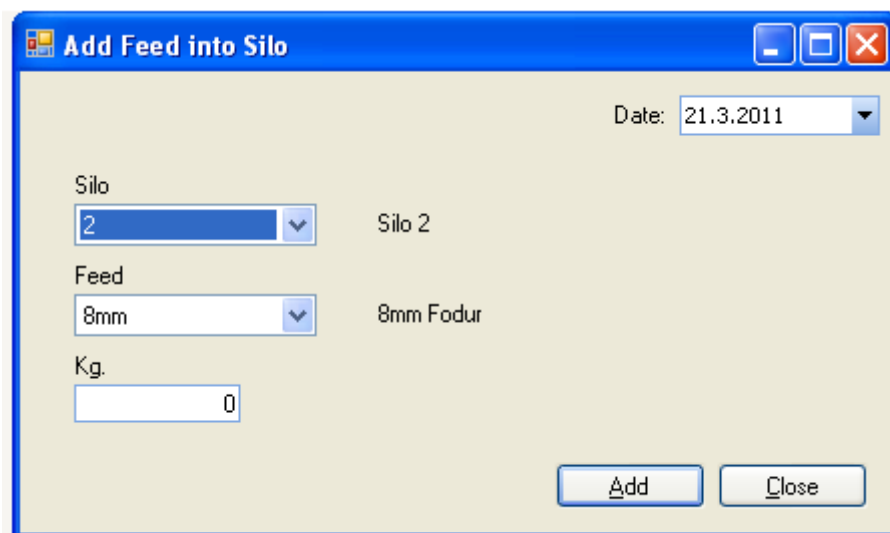
Pipe	Cage	Total	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	C01	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	C02	6.9	19	21	21	23	24	25	26	26	27	27	27	27	27	27	26	26	26	24	24	23	22	21	19	18
3	C03	6.6	18	20	21	22	23	24	24	25	26	26	26	26	26	26	26	25	24	24	23	22	21	20	18	17
4	C04	2.3	6	7	7	7	8	9	9	9	9	9	9	9	9	9	9	9	9	9	8	7	7	7	5	4
5	C05	28.9	80	86	91	96	100	103	107	109	111	112	113	113	113	112	111	109	106	104	100	96	91	86	80	74
6	C06	30.8	85	92	97	102	107	111	113	117	118	120	121	121	121	120	118	117	113	111	107	102	97	92	86	79
7	C07	37.1	102	112	117	122	128	133	138	143	143	143	148	143	148	143	143	143	138	133	128	122	117	112	102	97
8	C08	30.1	84	90	95	100	104	108	111	113	116	117	118	118	118	117	115	114	111	108	104	100	95	90	84	77
9	C09	7.8	21	24	24	26	27	28	29	29	30	30	30	30	31	30	30	29	29	28	27	26	25	23	22	20
10	C10	7.6	21	23	24	25	26	27	28	29	29	30	29	30	30	29	29	28	28	27	26	25	24	23	21	19
11	C11	6.5	18	20	20	21	23	23	24	24	24	26	25	26	25	25	25	24	24	23	23	21	20	20	18	17
12	C12	8.0	22	24	25	27	28	29	30	30	30	32	31	32	32	31	31	30	29	29	28	26	26	24	23	21
13	C13	24.2	31	41	36	41	46	51	61	82	122	133	133	148	148	148	143	133	133	102	77	56	46	41	36	31
14	C14	38.3	102	117	122	128	133	138	138	148	148	148	148	153	148	148	148	148	138	138	133	128	122	117	102	102
	Total kg.		7.3	8.1	8.4	8.9	9.3	9.7	10.0	10.6	11.2	11.4	11.5	11.7	11.7	11.6	11.4	11.2	10.9	10.3	9.7	9.1	8.6	8.1	7.4	6.9

view -> Refresh Cages/silos F5

Refresh changes that have been made on the program.

Action -> Add Feed

To add to or take feed from the silo, open the add feed into silo box, choose silo and Feed type then insert amount ("+" added "-"taken)



Date: Select the date when feed was added to silo. It is not necessary to insert information's about feed adding on same date as it was added.

Silo: Select silo that the feed was added to.

Feed: Select feed type. If the feed type is new and haven't been used before go to chapter xxx.

Kg: Amount of feed added to the silo. If some amount of feed is taken from the silo add (-) in front of the number. Then the feed is subtracted from the total amount.

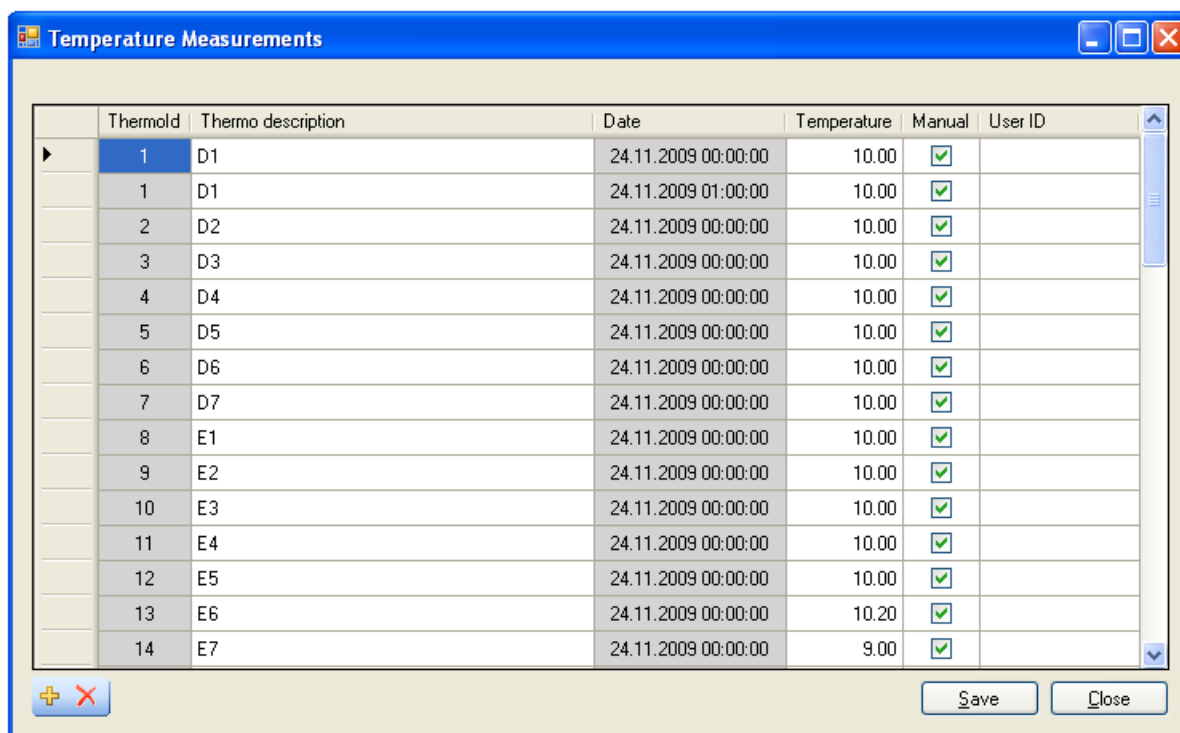
Add: Press the add button to make requested adding or subtracting changes.

Close: To close the window, press the close button or the (x) in the upper right corner.

Notice: You can also add feed to silo on the silo icon.

Action -> Add Temperature

Add new thermometer by pressing the "+" button Connect thermo to the cage by writing the thermometer name in the thermo description column. Write the temperature value in the temperature column. Remember to save the changes before closing the window.



	Thermold	Thermo description	Date	Temperature	Manual	User ID
▶	1	D1	24.11.2009 00:00:00	10.00	<input checked="" type="checkbox"/>	
	1	D1	24.11.2009 01:00:00	10.00	<input checked="" type="checkbox"/>	
	2	D2	24.11.2009 00:00:00	10.00	<input checked="" type="checkbox"/>	
	3	D3	24.11.2009 00:00:00	10.00	<input checked="" type="checkbox"/>	
	4	D4	24.11.2009 00:00:00	10.00	<input checked="" type="checkbox"/>	
	5	D5	24.11.2009 00:00:00	10.00	<input checked="" type="checkbox"/>	
	6	D6	24.11.2009 00:00:00	10.00	<input checked="" type="checkbox"/>	
	7	D7	24.11.2009 00:00:00	10.00	<input checked="" type="checkbox"/>	
	8	E1	24.11.2009 00:00:00	10.00	<input checked="" type="checkbox"/>	
	9	E2	24.11.2009 00:00:00	10.00	<input checked="" type="checkbox"/>	
	10	E3	24.11.2009 00:00:00	10.00	<input checked="" type="checkbox"/>	
	11	E4	24.11.2009 00:00:00	10.00	<input checked="" type="checkbox"/>	
	12	E5	24.11.2009 00:00:00	10.00	<input checked="" type="checkbox"/>	
	13	E6	24.11.2009 00:00:00	10.20	<input checked="" type="checkbox"/>	
	14	E7	24.11.2009 00:00:00	9.00	<input checked="" type="checkbox"/>	

Thermold: Thermometer number

Themo description: Shows the thermometer name (description).

Date: The date the thermometer ??

Temperature: Temperature measurements are added in this column. Click in the line for each thermometer to change the temperature.

Manual: Select manual when the temperature measurements are added manually.

User Id:

Save: save changes before the window is closed.

Close: To close the window, press the close button or the (x) in the upper right corner.

Notice: Thermometers can also be created automatically when a cage is created.

Action -> Send to PLC

Sends changed information to PLC. System sends those settings automatically every two hours, but if you just made some changes on any feeding settings and you want them to become active immediately, you will use this option.

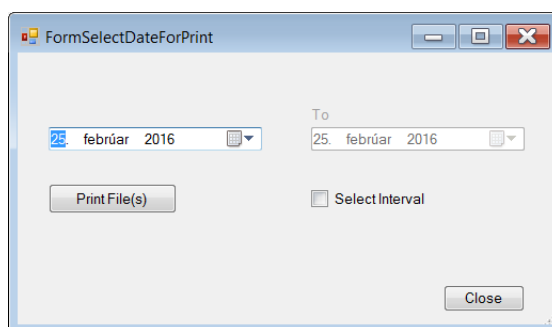
Action -> Feed info from PLC

Get feed info from PLC.

System fetches automatically feeding info from the PLC once every hour. Here is an option to force such fetch.

Action -> Update biomass

Update biomass. Notice that the biomass is automatically updated just after midnight every day.

Action -> Transfer files

Here it is possible to manually print file(s) containing feeding info which are intended to be transported to other systems. One file pr. each day is printed. Format is according to the Norwegian NS 9403 standard. Files will be printed to location as specified at: *Edit->Directories*

Report -> Growth and feeding history

Pick date range and run. Columns to display in the table can be chosen under: Configuration -> Report pg. 21

ReportFeedGrowth

From: 01/01/2016 To: 26/02/2016 Run

Drag a column header here to group by that column

Ca...	Cage descr.	Calc FCR	Given FCR	Total feeding	Total feeding	Total biom...	Total biom...	Avg weight end (kg) 2	Avg weight	Total male	Total female	Total	Total strpp...	Total harve...	Total correc...	Total mort...	Total mort...	Total mort...	Total moved	Total created	Total male	Avg weight	Total female	Total fish	Pop descr.	Pop name
C07		1.75	1.00	15.58	1,644...	2,841...	2,250...	0.03	0.02	0	0	99,686	0	-79,816	64,700	0	0	0	0	0	0	0.03	0	114,802		C07
C10		-2.22	1.00	6.21	362.23	502.91	496.66	0.01	0.01	0	0	60,592	0	-15,408	31,256	0	0	0	0	0	0	0.01	0	44,744		Lax 10
		-1.01	1.00	3.92	216.52	489.80	460.56	0.01	0.01	0	0	79,000	0	0	33,400	0	0	0	0	0	0	0.01	0	45,600		Lax 9
C12		-7.17	1.00	6.46	374.27	540.07	219.77	0.01	0.01	0	0	58,703	0	-15,297	52,241	0	0	0	0	0	0	0.01	0	21,759		Lax 12
C05		-1.34	1.00	10.71	1,306...	2,095...	3,218...	0.02	0.03	0	0	90,700	0	-78,500	65,700	0	0	0	0	0	0	0.02	0	103,500		Lax 5
		0.82	1.00	9.77	888.62	2,838...	860.10	0.03	0.02	0	0	94,000	0	0	47,000	0	0	0	0	0	0	0.03	0	47,000		Lax 8
C03		-0.74	1.00	5.22	338.88	407.94	822.23	0.01	0.01	0	0	52,300	0	-14,883	12,000	0	0	0	0	0	0	0.01	0	55,183		Lax 3
C13		1.76	1.00	14.29	1,286...	2,697...	2,315...	0.03	0.02	0	0	87,000	0	-66,000	51,900	0	0	0	0	0	0	0.03	0	101,100		Lax 13
C14		2.11	1.00	18.35	1,981...	3,507...	3,062...	0.03	0.02	0	0	105,000	0	-100,0...	81,000	0	0	0	0	0	0	0.03	0	124,000		Lax 14
C04		-0.55	1.00	5.79	430.94	273.07	818.15	0.00	0.01	0	0	75,852	0	0	17,827	0	0	0	0	0	0	0.00	0	58,025		Lax 4
C01		-0.57	1.00	5.16	382.78	207.64	687.96	0.00	0.01	0	0	59,325	0	-17,675	22,400	0	0	0	0	0	0	0.00	0	54,600		Lax 1
C11		-0.75	1.00	5.66	315.77	430.75	830.50	0.01	0.02	0	0	57,433	0	-41,567	44,000	0	0	0	0	0	0	0.01	0	55,000		Lax
		1.93	1.00	11.17	1,115...	2,935...	3,006...	0.04	0.03	0	0	83,630	0	-18,970	0	0	0	0	0	0	0	0.04	0	102,600		Lax 6 (C06)
C02		-0.72	1.00	6.87	514.17	283.00	904.53	0.00	0.01	0	0	76,487	0	0	7,962	0	0	0	0	0	0	0.00	0	68,525		Lax 2
C09		0.63	1.00	1.58	107.59	519.60	0.00	0.01	0.01	0	0	59,724	0	-19,276	0	0	0	0	0	79,000	0	0.01	0	0		Lax
C08		0.58	1.00	1.28	192.15	1,687...	0.00	0.01	0.01	0	0	152,000	0	0	52,000	0	0	0	0	100,000	0	0.01	0	0		Lax
C06		0.36	0.75	1.41	199.36	2,676...	0.00	0.02	0.02	0	0	141,600	0	0	22,600	0	0	0	0	119,000	0	0.02	0	0		Lax

ExcelPdf

Configuration:

Under this xx is it possible to make configurations for the main parts of the system. Such as: farm information, population, feed types, SGR tables and Hardware. The hardware changes are divided in; encoder and pipes, cages, silo and thermometers.

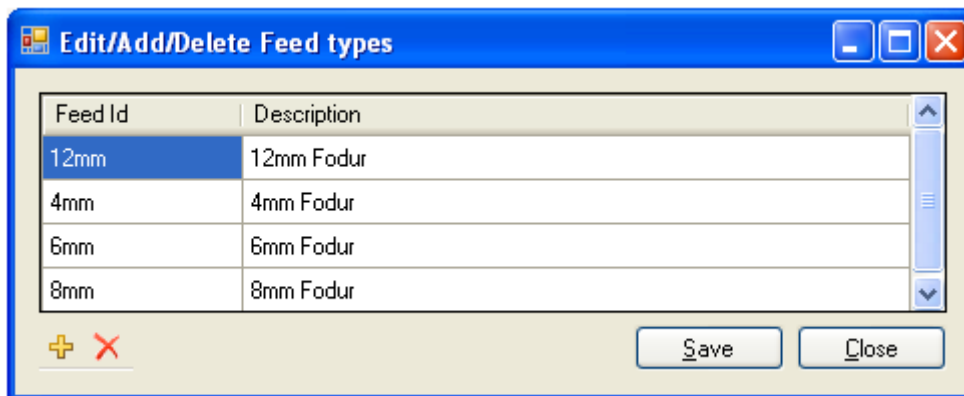
Configuration -> Farm

The farm settings box shows information about the farm the name and location. Name, address, city, post code, country, comments.

See more at: System definition and application startup, pg.27

Configuration -> Feed types

Feed Id shows the id of the feed e.g. the description column gives information about the feed like the diameter. + , and x are add and delete buttons.



Feed Id: Feed Id here the feed Id is the mm of the feed size.

Description: Description of the feed type, in this example it is also the mm of the feed that describes the feed.

Configuration -> SGR Tables

SGR growing table shows water temperature in cages versus average fish weight in population. One standard growth table is in Vaki VPN_admin "Vaxtartafla". To suit other specifics like trout and halibut it is necessary to add new SGR table. Other weight tables are more suited for these species and have other weight intervals.



It's possible to use the included growth table or add new growth tables by clicking on "new" button. Add temp Add Weight buttons gives the table new column or line.

SGR Id: is the name or Id for the SGR table.

New button: is for adding new SGR table. Then the table Id is inserted and information's filled in to the SGR table.

SGR table: °C\Gr. The first column in the SGR table shows the temperature in °C the first line shows the Gr.

Add Temp: Add temperature line to the SGR table.

Add weight: Add weight column to the SGR table.

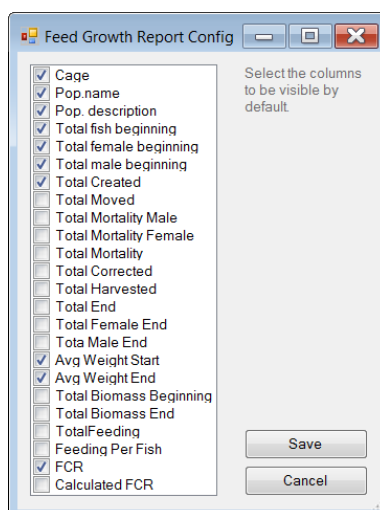
Refresh: Recalculates changes

Save: Save the changes. It is Important to save changes before the window is closed.

Close: close the From SGR window.

Configuration -> Report

Select which columns should be visible in the **Feed Growth Report**



With column descriptions:

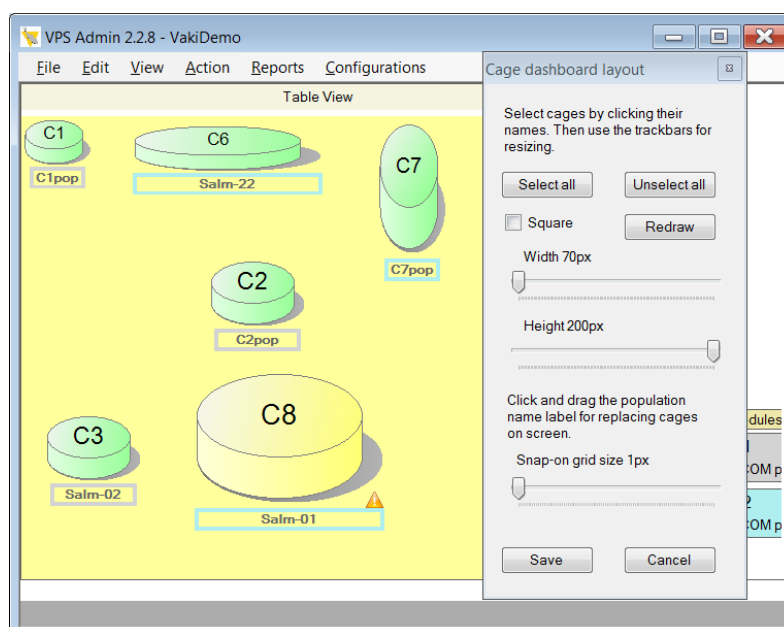
Cage: Shows the cage number/name.
Pop (population): Shows the population Id.
Description: Fish history/saga where is he coming from?
Total fish beginning: Total amount of fish in the beginning of chosen time period.
Total female beginning: Total amount of female in the beginning of chosen time period.
Total male beginning: Total amount of male in the beginning of chosen time period.
Total Created: amount of populations started at the time period.
Total Moved in/out of population: Total amount of fish moved from population.
Total Mortality Female: Total mortality of female.
Total Mortality Male: Total Mortality of Male.
Total Mortality: Total mortality of female and male.
Total Corrected: Corrections of total amount of fish e.g. recounting unknown reason for changes.
Total Harvested: Amount of harvested fish.
Total Stripped: Total amount of stripped fish.
Total End: Total amount of fish in the end of chosen time period.
Total Female End: Total amount of female in the end of chosen time period.
Total Male End: Total amount of male in the end of chosen time period.
Average weight Start (kg) in the beginning of period Biomass (kg): shows the biomass in the cage in kilos. Biomass is number of fish multiplied with average weight.
Average weight End (kg) in the end of period

Total Biomass Beginning (kg):
Total Biomass End (kg)
Total Feeding (kg): Total amount of feeding during the chosen period. The next field is the "total feed so far" This field will show how many kilos are fed since the cage was started up. The actual calculated feed conversion factor will be presented. This factor is calculated from the number and weight of fish and the total feed amount from start up.
Total Feeding pr. Fish: Total amount of feed for each fish.
FCR: Current FCR. Feed used to product one Kg of fish.
Calculated FCR. Feed conversion factor: The feed conversion factor is value representing the weight gain in the fish from one kilo of fish feed. If the fish is fed 100 kg and the conversion factor is set to 1.2 the biomass should increase $100/1.2=83.33\text{kg}$.

Activity factor: Activity factor is a value t increase or decrease the feeding calculated by the growth table. The activity factors are multiplied with calculated amount of feed. For example if the software have calculated a feed demand od 100kg but the activity factor are set to 805 the feed output will be $100\text{kg} \cdot 805 = 89\text{kf}$

Configuration -> Dashboard layout

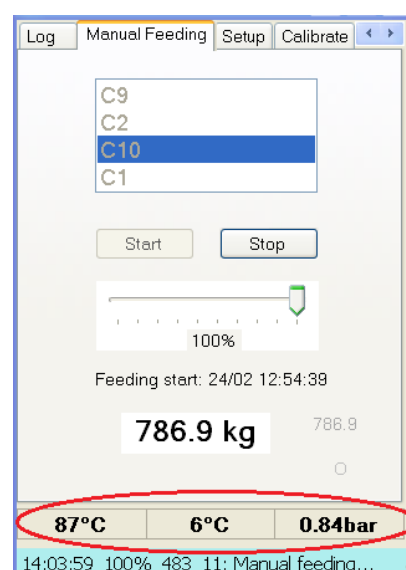
A tool to move the cage icons around on the screen and adjust their dimension

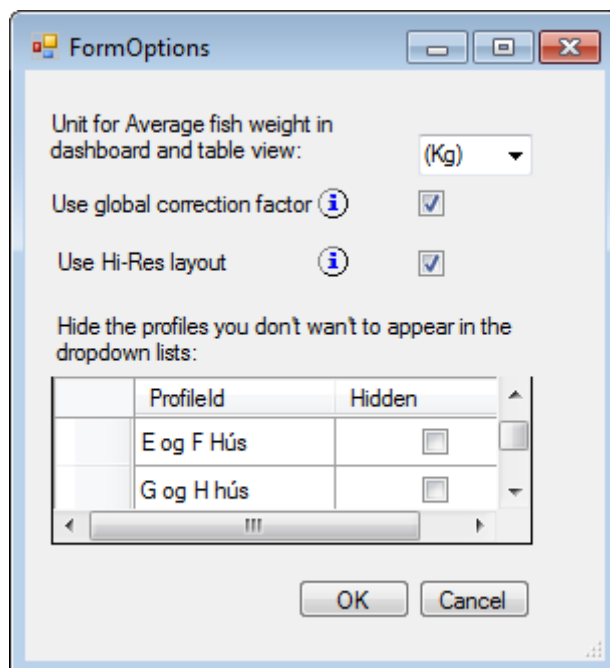


Configuration -> Sensors

There are some feeding systems where it is important to monitor temperature and pressure of the air blown into the pipes. These temp- and pressure sensor are connected to a dedicated PLC machine and here we can set up the Ethernet communication to it so values from sensors can be displayed on *VPS_Admin* main screen. Here we also define wich values are acceptable and when to issue warning.

Picture shows resulting readouts from a sensors on system under operation.



Configuration -> Options

Here at top we can set preferred unit for the average fish weight.

Click on the **(i)** to bring up further information on options.

Global correction factor: *Global correction factor will affect all nonempty populations visible in the board, with <Auto update> set ON. Every time the factor is activated or changed the correction factor of each of the populations will get the same value. If the global factor is active and the correction factor of a population is changed to a different value, that population will get a warning status.*

Use Hi-Res layout: *If content of some pop-up boxes and forms don't fit within it's boundaries, you should check this one. You need to reboot application for changes to show.*

At the bottom you can hide unused profiles so they are not taking up space in the dropdownlists.

Configuration -> Hardware**Configuration -> Hardware -> Create Cages**

Create new cage definitions. See description in the setup section: Create Cages, pg.33

Configuration -> Hardware -> Silos

Add silos to the system. See description in the setup section: Define Silos, pg.29

Configuration -> Hardware -> Thermometers

Option to add thermometer definitions.

Configuration -> Hardware -> Encoder and pipes

Pipes and encoder

Settings for the encoder size and then connections between the encoder and pipes, where should the rotator valve stop to feed through correct pipe. When those connections are installed the Cages are connected to the pipes.

Site - Configuration

Settings Id: No Of Cages:

Description:

Com Port:

Pipes and Encoder | Slave 1 | Slave 2 | Cages

No	Encoder	Pipe Desc.	Cage Id	Sec. to empty
1	4056		G1	5
2	74		100	10
3	188		E1	5
4	301		E2	5
5	415		E3	5
6	529		E4	5
7	643		E5	5
8	756		E6	5
9	870		E7	5
10	984		100	5
11	1098		F2	5
12	1212		F3	5
13	1325		F4	5

Round Time:

Rounds Pr Hour:

No Of Pipes:

Encoder Size:

Offset:

The table connect the encoder to feeding pipes and the feeding pipes to cages.

Number of the encoder stop is shown in the first column;

Encoder value: The value where the encoder should stop to hit the holes.

Pipe descriptions: Description of pipe if needed not necessary.

Cage Id: Appropriate cage

Sec. to empty pipe is the time the blower is using to blow the feed through the feeding pipes.

Round time is the time that the "rotator?" is going the 360° circle. The accuracy is more when the round time is slower.

Rounds per hour, is the feeding frequency in each cage for one hour. The more feeding frequency per hour the smaller the feedings are and vice versa.

Number of pipes is the possible pipe number on the changer.

Encoder size offset helps to set the Encoder stops.

Add: Recalculates all encoder offsets based on number of pipes and registered offset

Reset: Recalculates all encoder offsets based on number of pipes

Slave

This sheet is for slaves users.

Cages

This sheet shows if the pipe to silo is active or not.

Site - Configuration

Settings Id: No Of Cages:

Description:

Com Port:

Pipes and Encoder Slave 1 Slave 2 **Cages**

CageId	Description	Active	DateStarted
100		<input checked="" type="checkbox"/>	28.9.2010
D1		<input checked="" type="checkbox"/>	13.11.2009
D2		<input checked="" type="checkbox"/>	13.11.2009
D3		<input checked="" type="checkbox"/>	13.11.2009
D4		<input checked="" type="checkbox"/>	13.11.2009
D5		<input checked="" type="checkbox"/>	13.11.2009
D6		<input checked="" type="checkbox"/>	13.11.2009
D7		<input checked="" type="checkbox"/>	13.11.2009
E1		<input checked="" type="checkbox"/>	13.11.2009
E2		<input checked="" type="checkbox"/>	13.11.2009
E3		<input checked="" type="checkbox"/>	13.11.2009
E4		<input checked="" type="checkbox"/>	13.11.2009

Save Close

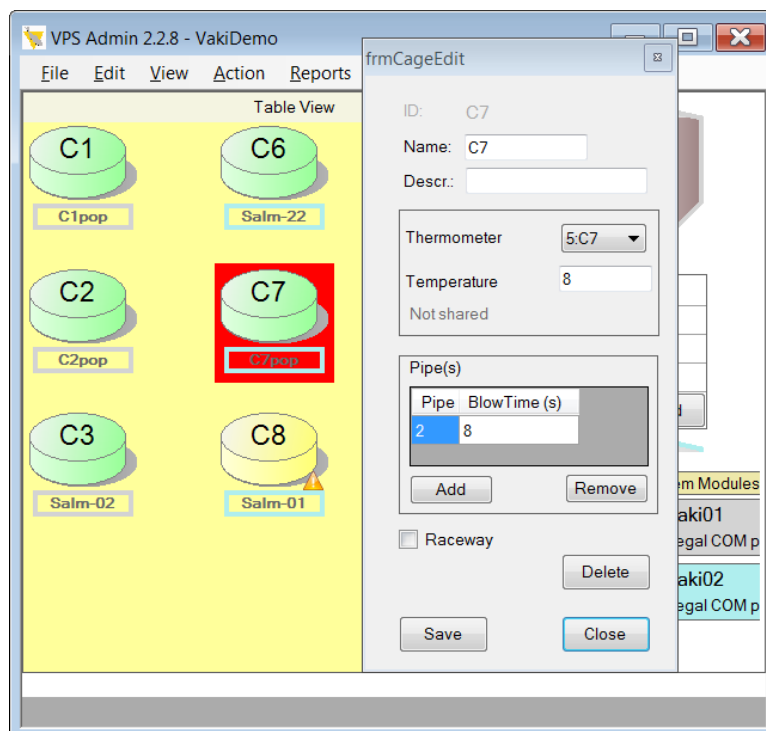
Cage Id: This column shows the list of cages

Active: The active column shows if pipe is connected and active from the feeding system to cage.

Date Started: The column shows when pipe from the feeding system was connected to each cage.

Configuration -> Hardware -> Edit Cages

An option to modify some of the setting belonging to a selected cage



You select a specific silo by clicking its name (C7 here).

Name: When a cage is created it will get a name which is the same as its ID number. Its name can be modified but the ID number is unchangeable.

Descr: Just an optional description for this cage.

Thermometer setup can be changed and the temperature value of currently connected thermometer can be edited.

Pipe(s) setup can be modified here.

Raceway: Check to define this cage as raceway

Delete: You can delete a cage here if no population is attached to it and no feeding information registered on it

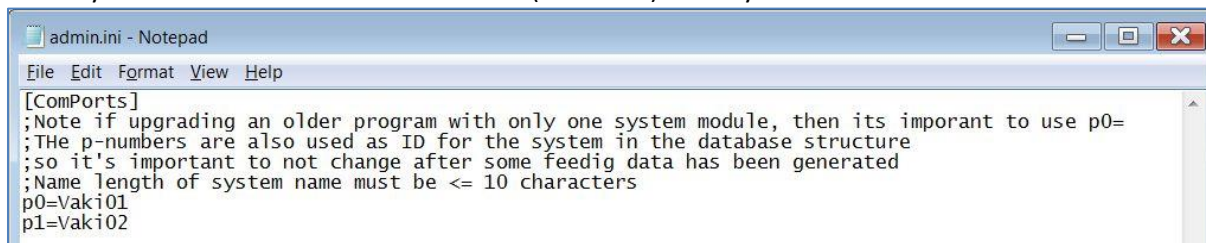
Initial setup

This section is a walk through of a typical setup of a Vaki feeding system. Some of the chapters herein may also be usable when some modification need to be done on the system later in the systems lifetime.

System definition and application startup

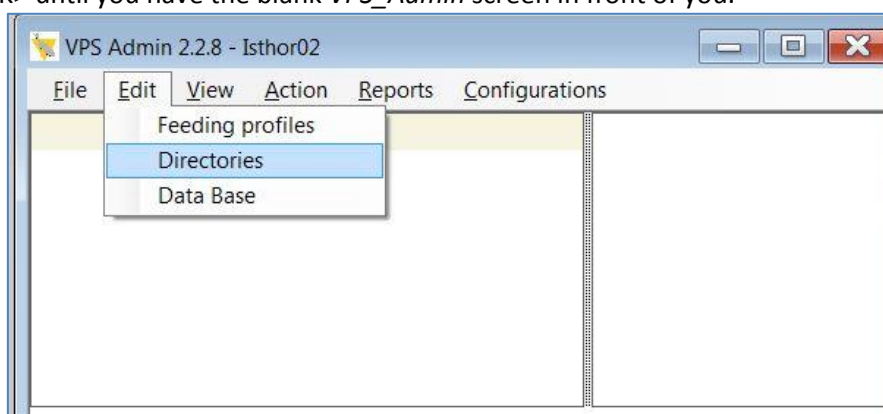
We will show the initial setup here. Starting from a fresh database, containing no data.

We are going to build a demo where the *VPS_Admin* will manage 2 feeding systems. We will name these systems *Vaki01* & *Vaki02*. The init file (admin.ini) shall be like this:

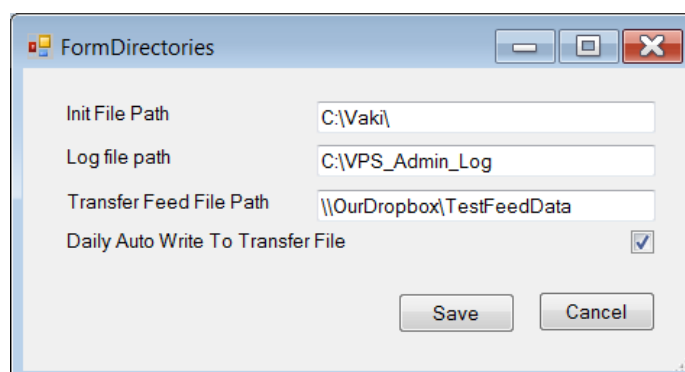


The *VPS_Admin* application comes in a zip file. After extracting its content, just run the *Setup.exe* and the application should be ready.

First time you run the application you may see some error messages. Ignore them for now and just press the <OK> until you have the blank *VPS_Admin* screen in front of you.



You need to set the correct path to the init file: admin.ini, described above under the *Directories* option:

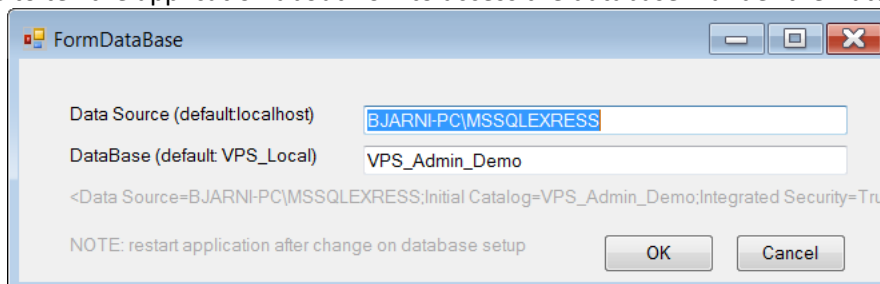


Log file path is also good to define, especially during the run up of the system. Log files may become helpful to track down various kind of problems. If log file path is left empty, nothing will be logged.

The transfer file path is used if we are transferring feeding info to some external systems.

Files with feeding info will be written to that location – automatically by the end of the day if the checkbox below is checked.

We also have to tell the application about how to access the database – under the *Data Base* option:

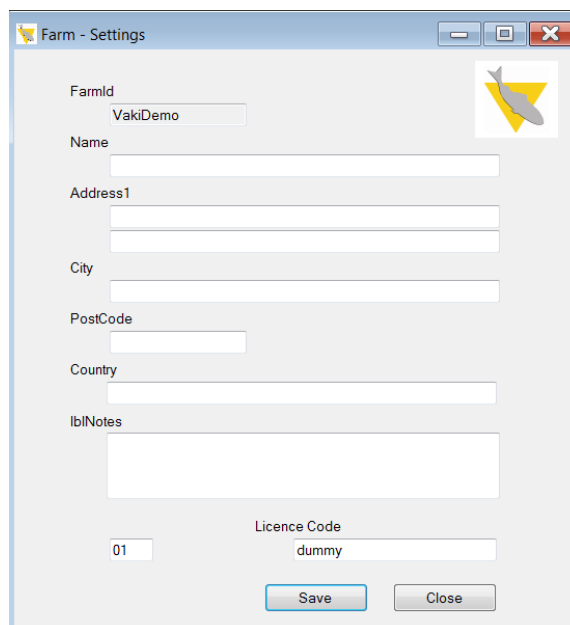


The screenshot shows a dialog box titled "FormDataBase". It contains two input fields: "Data Source (default:localhost)" with the value "BJARNI-PC\MSSQLEXPRESS" and "DataBase (default VPS_Local)" with the value "VPS_Admin_Demo". Below these fields, a greyed-out line shows the connection string: "<Data Source=BJARNI-PC\MSSQLEXPRESS;Initial Catalog=VPS_Admin_Demo;Integrated Security=Tru". At the bottom, there is a note: "NOTE: restart application after change on database setup", and two buttons: "OK" and "Cancel".

Here we see an example of how a database setup might look like. (Notice the defaults though, in most cases they can be used). In the greyed line below the input fields you see the current connection string the db connection.

After verifying and saving init file and database setups, you need to restart *VPS_Admin*.

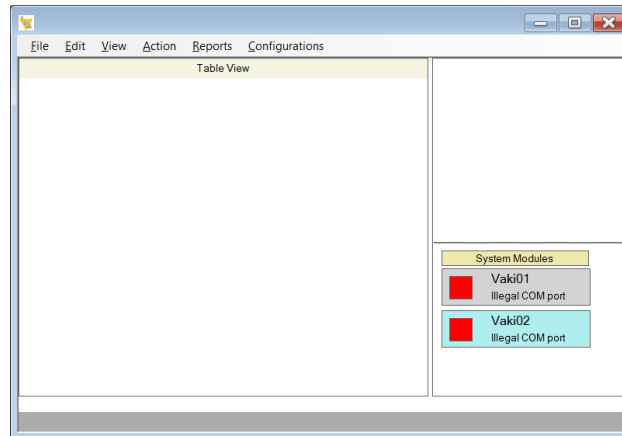
When the application starts up and detects the empty database it will pop up a form where you have to define the farm:



The screenshot shows a dialog box titled "Farm - Settings". It contains several input fields: "FarmId" with the value "VakiDemo", "Name", "Address1", "City", "PostCode", "Country", and "IblNotes". At the bottom, there are two more fields: "Licence Code" with the value "dummy" and a small field with the value "01". There are two buttons at the bottom: "Save" and "Close".

The *FarmID* is mandatory and you will not be able to change it again later! You should also put some value in the *Licence Code* field. Leaving it empty might cause problems later.

When *VPS_Admin* comes up, it should look similar as this one:



Notice there are like 3 fields on the screen. The one on the left will contain the cages, but the upper right will contain the silos, when defined. The vertical and horizontal border lines can be dragged by the mouse to adjust the field sizes. The changed border positions will be automatically saved.

PLC/PC connection

The PLCs are connected to PC via serial port. In our example here we should have two serial ports to the PLCs. Some of the PC computers used have serial ports, but in others we are using serial to USB adapters.

If we are using the USB adapters, a comport number is automatically assigned to the port, and you need to enter this port number to setup the communication between *VPS_Admin* and the PLC. In the Windows *Device manager* under Com ports you should be able to find the assigned Com port number(s).

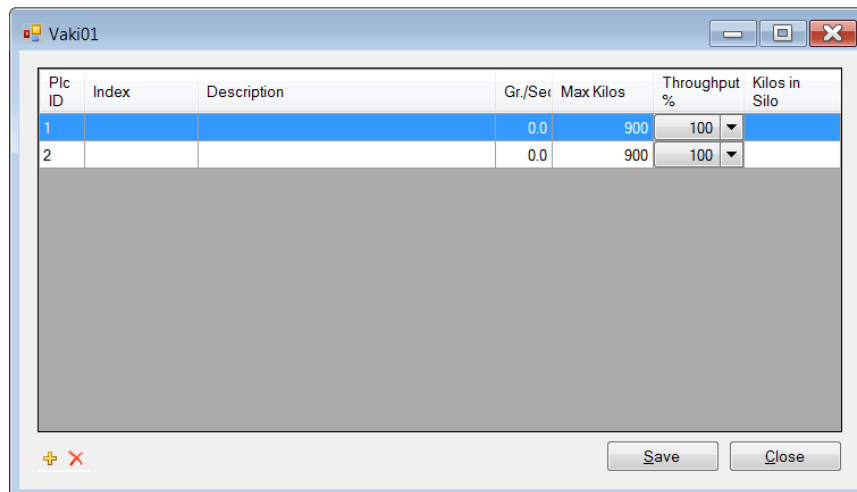
You have to click on the feeding system icon in the lower right quarter of screen to bring up the control page for that system. Select the *Setup*-tab and enter the Com port number. Save and try *Reconnect*. If that's not enough to get online with PLC – try to restart the *VPS_Admin* application. See also: Setup tab, pg.12

Define Silos

We want to define two silos for each system.

To create the silos for *Vaki01* we do the menu path:

Configurations->Hardware->Silos->Vaki01



You create two silos by clicking the + (at the lower left) twice. Enter the capacity of the silo (can be changed later) but just leave the other fields empty.

We do the same for the second system:

Configurations->Hardware->Silos->Vaki02

Notice that the silos for the first system will get the id numbers 1&2, but for the second system it will be 11&12.

Throughput:

Controls the feed flow, the feed flow can be set on 25%, 50, 75% and 100%.

If the factor is set to 25% the auger works in one sec and rest in three sec.

If the factor is set to 50% the auger works in one sec and rest in one sec.

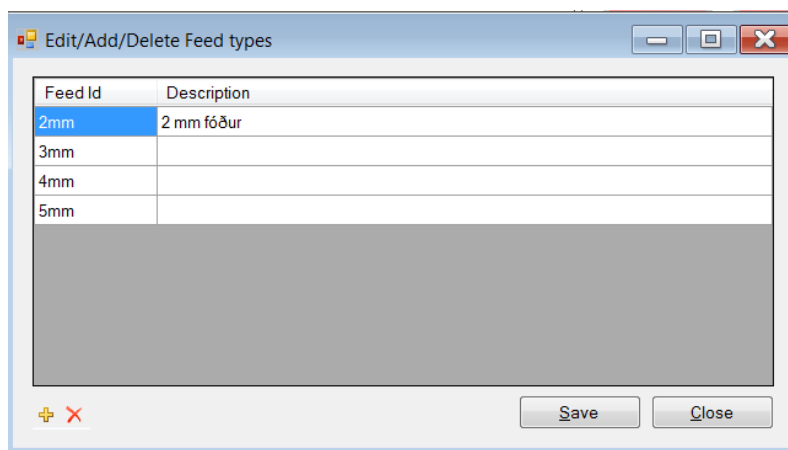
If the factor is set to 75% The auger works in three sec and rest in one sec.

If the factor is set to 100% the feeder will feed in one portion.

Define feed types and add food to silos.

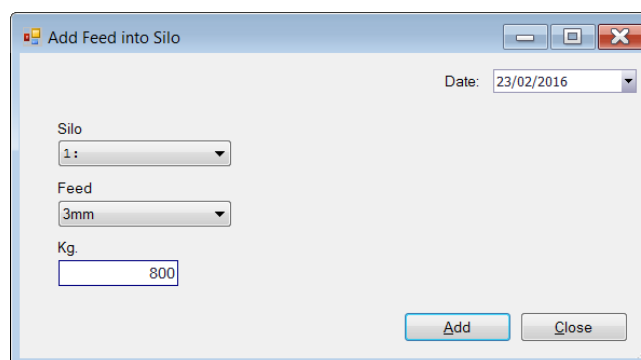
Before registering feed into the silos we need to create the types of food we are going to use. Se path:

Configuration->Feed Types



Use the + sign to add food type. Enter a descriptive Feed Id, but the description is optional.

To add food to a given silo, just move the mouse over that given silo icon on the screen and press the <Add food> button. There you select the food type and enter the amount of food which is being put into the silo:



Calibrate Silos

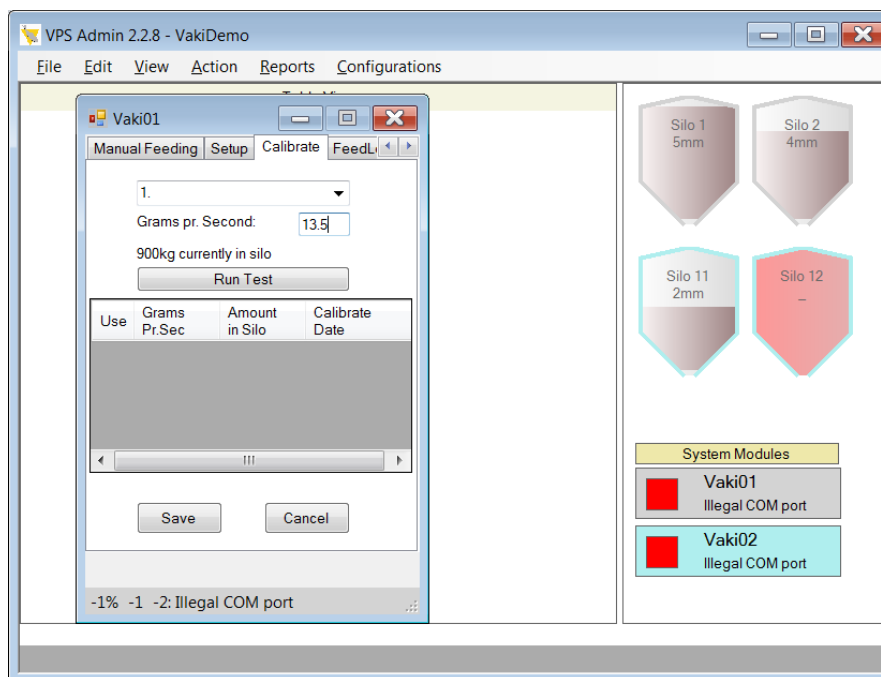
The amount of food given is controlled by time adjustments. We determine how much food we deliver from silo (by the augers in most cases) pr/time unit.

In short, we do like that: Run the auger for a specific amount of time. Collect the food coming from it and then put it on a scale and weight it. Then we do the math:

$$(\text{Amount in grams})/(\text{Seconds auger running}) = (\text{calibrated grams pr/ second})$$

Then we enter the resulting grams pr. Second as the calibration value.

To calibrate Silo 1, which belongs to the *Vaki01* feeding system, we have to click on the *Vaki01* icon in the lower right corner to bring up its control window and there select the Calibration tab.



Notice we select the silo ID number in the dropdown box.

Notice the <Run Test>. You can click that button to run the auger for a specified amount of time – but only if the status strip at the bottom of the dialog shows: “Manual ready”; there is a button on the PLC’s el-cabinet which can be used to put the PLC into that state.

After running the test and having the measurements, you enter the resulting value into the edit field (13.5 here) and press *Save*. Repeat this for each silo.

(If you are working in the setup phase of the system you can of course just put in some dummy numbers as calibration values and correct them later when feed has been put in the silos)

See more about calibrations: Calibrate tab pg.12

Set encoder and number of pipes

To change the encoder settings go to:

Configuration->Hardware->Encoder and pipes->VakiNN

Set round time and rounds per hour and number of pipes, encoder size and offset. This window is described in more details in chapter: Configuration -> Hardware -> Encoder and pipes, pg. 24

Thermometers

Although thermometers are listed here under hardware, the *VPS_Admin* doesn’t currently support automatic connection and reading of the real thermometer. We depend on user registering the temperature for each defined thermometer when needed. It is important to know the temperature in the cages to be able to estimate the growth of the fish living there.

Many cages can share one thermometer – or one thermometer can be created for each cage.

There are two ways to create the thermometers:

- Go to the thermometer page under: *Configuration->Hardware->Thermometers*
- Automatically create thermometer when the cages are created – such that each cage has its own thermometer (see Cage create section)

Register temperatures

One way to register temperatures is to go to: *Actions->Add temperature*

Here you will get a list of all thermometers defined in the system and you can edit the temperature value for them.

Another way is to use the *Cage edit* feature: *Configuration->Hardware->Edit cages*

which will bring up the edit cage dialog here from you can select individual cages from the main screen and edit the temperature of the thermometer attached to that given cage.

Create Cages

Create cages dialog (for Vaki01) at:

Configuration->Hardware->Create cages->Vaki01

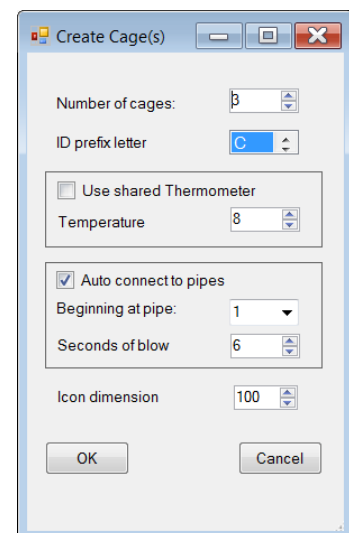
Number of cages: You can create multiple cages in one operation

ID prefix letter: The ID/Name of the cages will become on the form C1, C2...

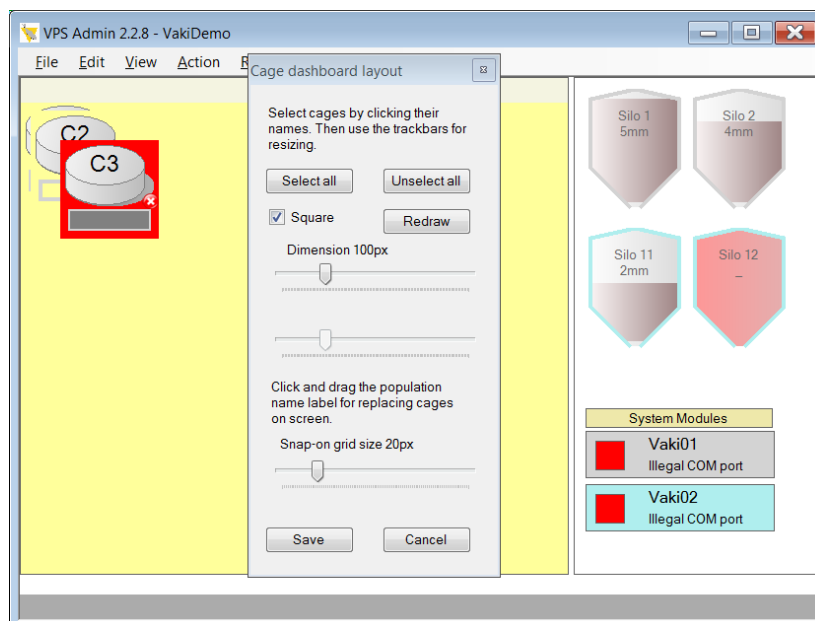
Use shared Thermometer: If NOT checked, a separate thermometer will be created for each cage. If checked, after creation of cage you'll have to edit the cage settings and assign a thermometer to it.

Auto connect to pipes: Pipes and encoder must have been defined before to use this option. In this case the cages being created now will be assigned to pipes 1,2&3. If you leave this option unchecked, you'll have to assign pipes to cages later in the encoder & pipes page: *Configuration->Hardware->Encoder and pipes*

Icon Dimension: The original dimension of cage icon will be according to this setting (in pixels). It can be modified later.



When pressing the <OK> button, the cages are created and the 3 icons will appear stacked in the upper left corner of the screen. The *Dashboard layout* dialog will pop up so you can drag the icons into desired places on the screen and adjust their dimension as desired:

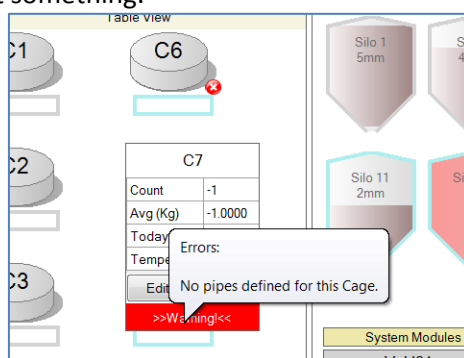


Notice the colours around the silos and the name field under the cage icons. The colours show to which feeding system they belong to. Grey for Vaki01 and blue for Vaki02.

The dashboard layout can be modified at any time: *Configuration->Dashboard layout*

Make cages ready for use

Notice above that when you have just created the cages, that they are grey and it might be this red warning 'x' in its lower right corner. The grey colour tell us that the setup isn't finish and the red warning also gives a hint about something.



When creating the cages for Vaki02, we did not automatically connect it to the pipes, hence the red warning. Hover the mouse over cage and the >>Warning!<< to bring up the message.

To make the cages ready, you need to:

- Connect cage to a silo (the silo tab)
- Activate "Auto update"
- Select SGR table to be used (which of course implies that the table must be created or imported first)
- Select a feeding profile (which of course implies that one must be created first) (see profile tab)
- Create a population into the cage and enter its average fish weight (or move it from another cage)
- Press <Calculate feeding> to get the feeding amount pr/day now (else it will just be calculated automatically by the end of the day)

To access all this you press the <Edit> button which shows up when mouse is hovered over the cage icon:

Population C1pop [Origin: C1pop]

Pop Name: C1pop - (C1) Parent Population:

Description:

Population Profile (General) Cage [C1] Silo [1]

Number of Fish

Total: 100,000 ...

Female:

Male:

Unknown: 100,000

Auto Update: ☒

SGR

SGR: Club N Cai

FCR: 1.00

Corr. factor: 1.00

Feeding Info

Yesterday: 0 (Gr.)

Today: 0 (Gr.)

Average Weight: 0.0500 (Kg)

Total feed per day: 55 (Kg) ☒ Calc. Feeding

Active: ☒

Total biomass: 5000 (Kg)

Refresh Save Close

See also the population section: Populations, edit & setup, pg.7