COMRISK
COMMODITY RISK MANAGEMENT INNOVATION

HEDGING PRO

Better Hedging
with the right numbers

1

Agenda

- What we do
- Hedging with the right parameters: business impact
  - Dairy
  - Grains
- Sneak Preview of tomorrow's session
  - Hedging solutions used in the field

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What we do

- Hedging Advise
  - **Calculate parameters** for single hedge products
  - **Calculate hedging possibilities** for products that do not have straightforward relevant futures
    - Ex. Hedging raw materials used in production with oil, coal, energy
  - **Interactive Dashboards** for dynamic selection by user
  - Hedging **maintenance**
- Data science projects
  - Forecasting using profit distribution probability functions
  - Effect of decisions on net company results

COMRISK
COMMODITY RISK MANAGEMENT INNOVATION

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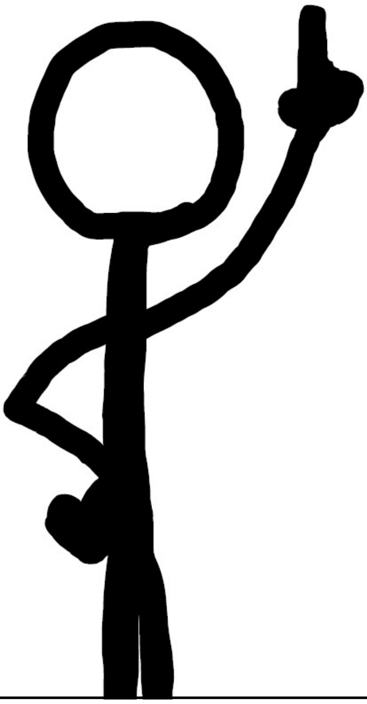

Main Character

- **Role**: Sourcing Manager
- **Company**: Pig Feed Producer / European Dairy Processing Plant
- **Goal**: fix price of product needed in the future

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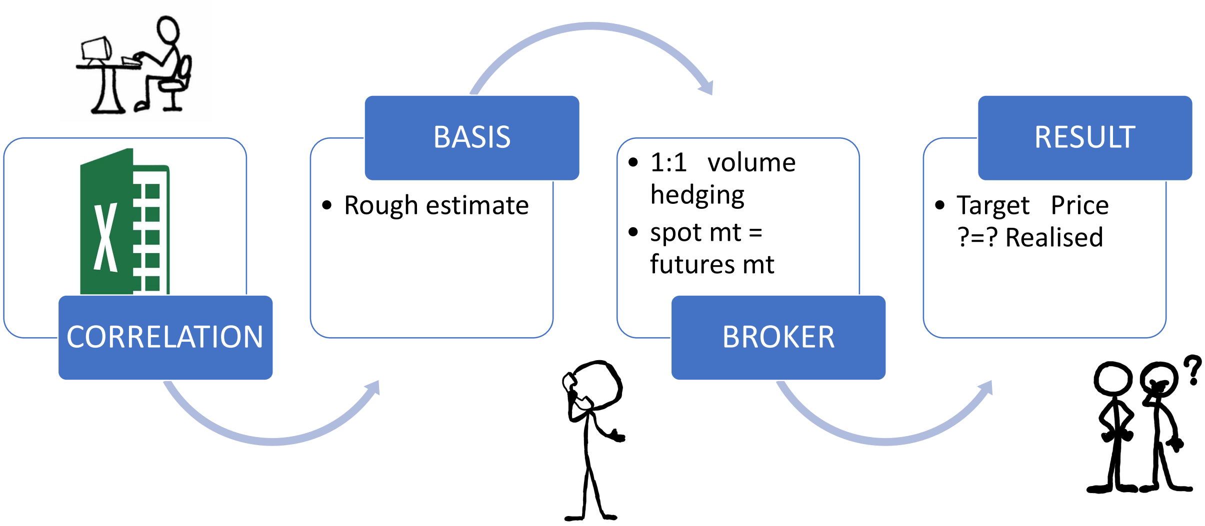
Hedging without Hedging Pro = Losing Money



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LEI Pig Feed Index

- Close price relationship
  - Wheat and Corn (MATIF / EURONEXT) Europe
- Looking beyond correlations

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Setup

<u>Correlation</u>

jan 2012- Sep 2019
0,96
Milling Wheat – MATIF

<u>Basis</u>

66 €/mt

<u>Quantity – how much powder?</u>
Broker says 1:1
1 contract = 50 mt
2.000 mt = **40** contracts MWheat

<u>Target Price</u>

176 €/mt	Sep19 contract MW @ Mar 19
66 €/mt	Basis
	+
242 €/mt	

2.000 mt @ 1 Mar 2019 for delivery September 2019

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Result

<u>Target Price</u>

176 €/mt	Sep19 contract NFDM @ sep 17
66 €/mt	Basis
	+
242 €/mt	

<u>Futures Result</u>

176 €/mt	Sep19 contract MW @ Mar19
L	
159 €/mt	MW @ expiration
S	
	net
-/- 17 €/mt	

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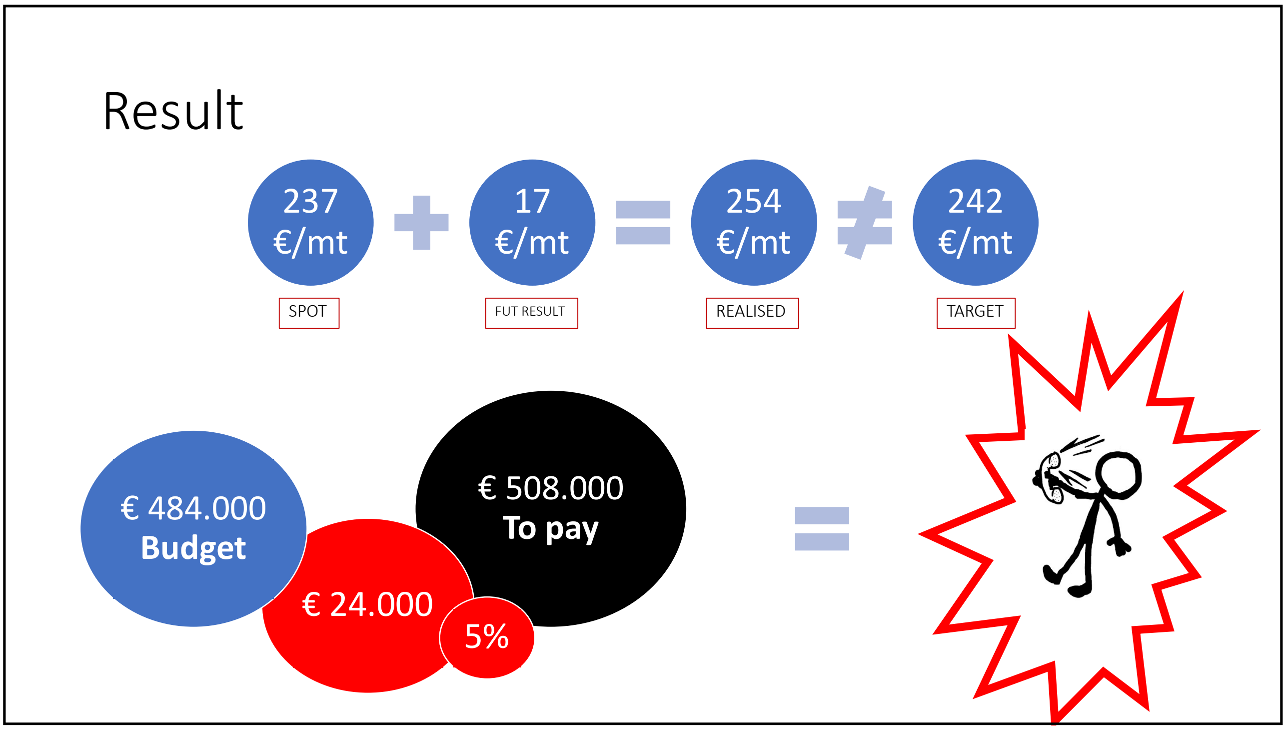
Result
237 €/mt
SPOT
17 €/mt
FUT RESULT
254 €/mt
REALISED
242 €/mt
TARGET
€ 484.000
Budget
€ 24.000
5%
€ 508.000
To pay

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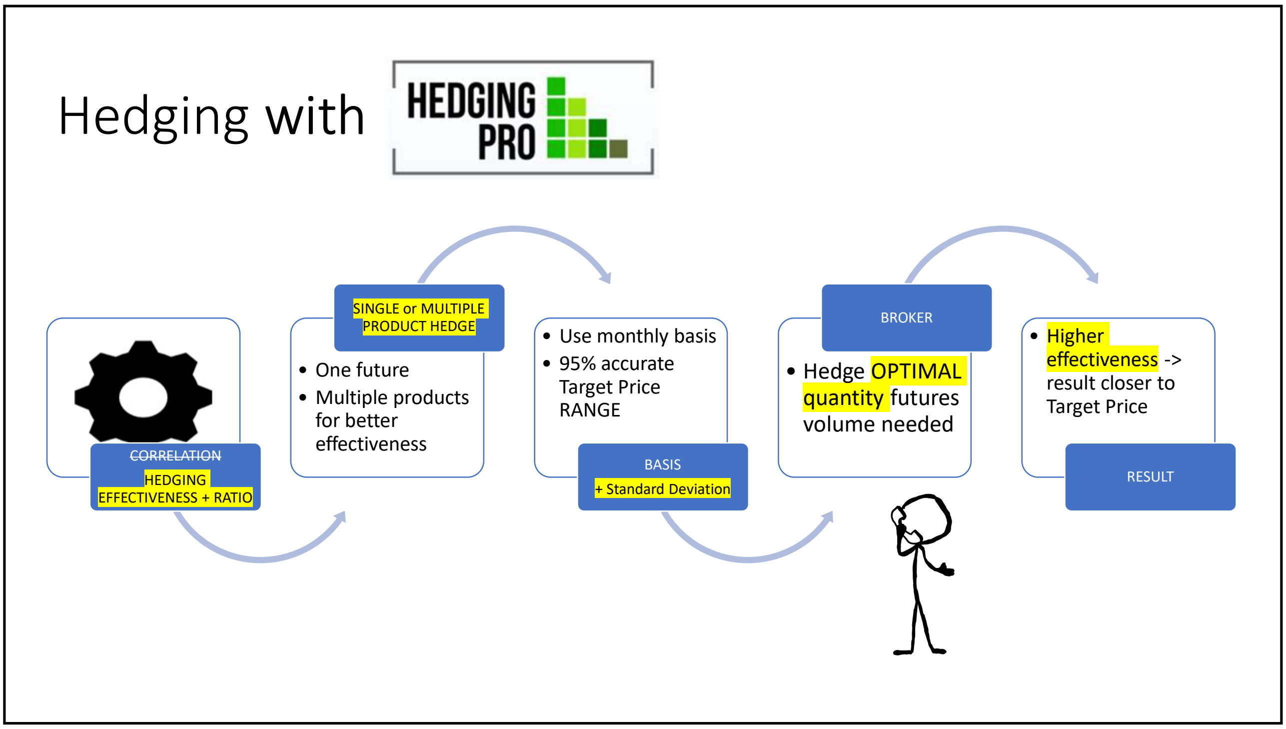
Hedging with
HEDGING PRO
~~CORRELATION~~
HEDGING EFFECTIVENESS + RATIO
SINGLE or MULTIPLE PRODUCT HEDGE
• One future
• Multiple products for better effectiveness
• Use monthly basis
• 95% accurate Target Price RANGE
BASIS
+ Standard Deviation
BROKER
• Hedge OPTIMAL quantity futures volume needed
• Higher effectiveness -> result closer to Target Price
RESULT

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What went wrong

Hedging **Ratio**	• Ratio = 0,78 instead of 1
Correct number of **contracts**	• 31 contracts vs. 40 contracts
Basis + **TP** range	• We did not use the month specific basis -> 71 €/mt instead of 66 €/mt

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Setup

<u>Effectiveness</u>

jan 2012- Sep 2019
0,96
Milling Wheat – MATIF

<u>Basis - SEPTEMBER</u>

71 €/mt

<u>Quantity – how much wheat?</u>
Use hedge ratio of 0,78
2000 mt feed = 2000 x 0,78 / 50 = **31 contracts MWheat**

<u>Target Price</u>

176 €/mt — Sep19 contract MW @ Mar 19

71 €/mt — Basis

\+

247 €/mt

2.000 mts @ 1 March 2019 for delivery Sep 2019

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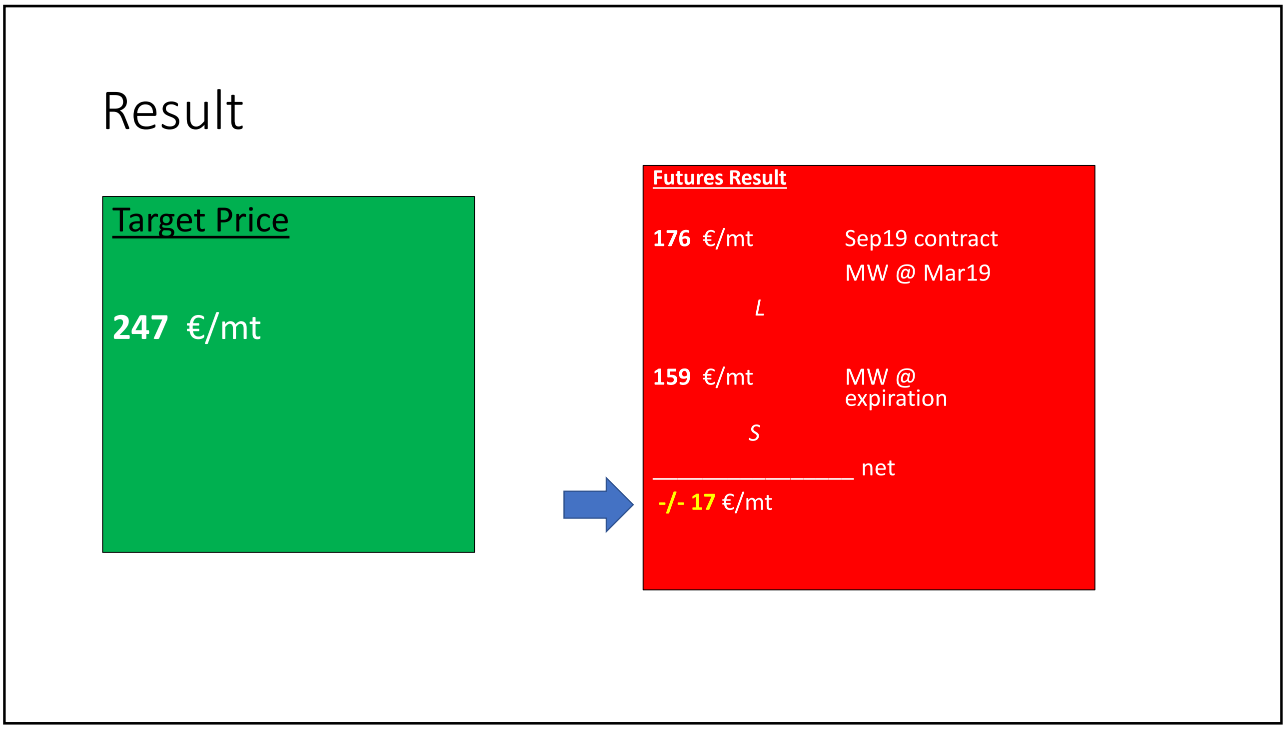
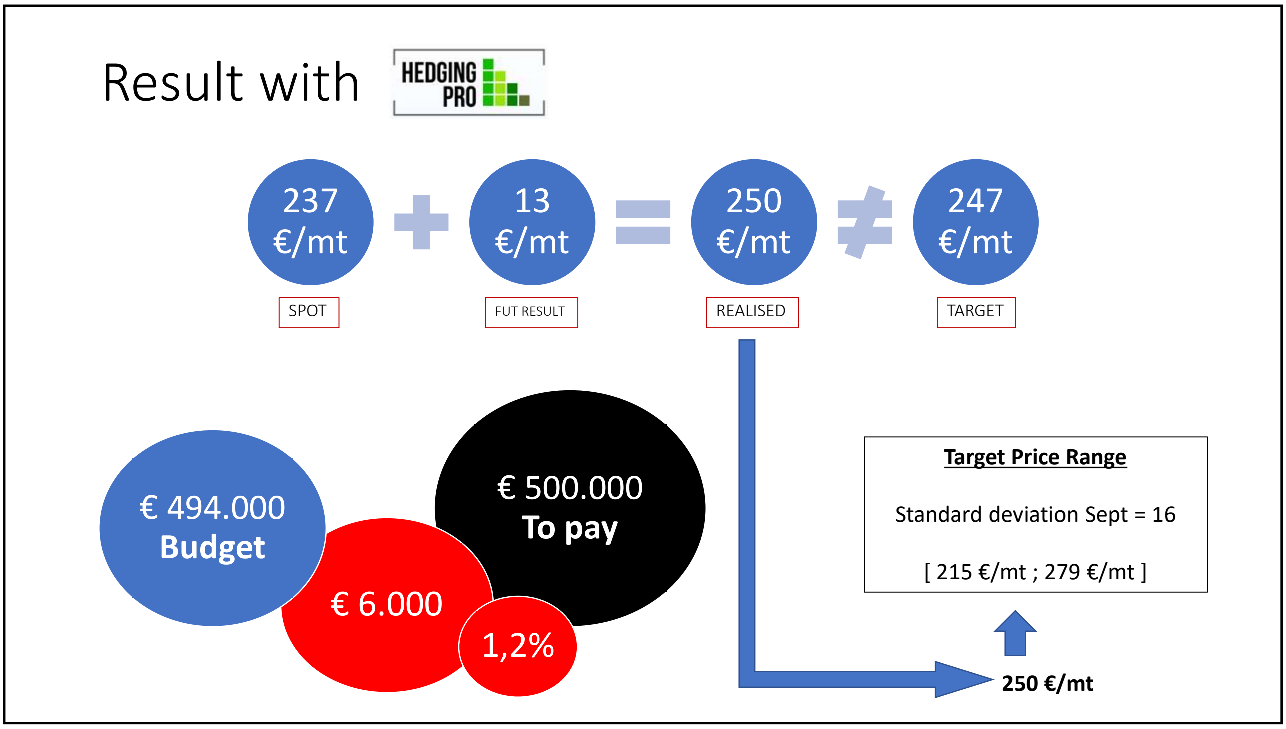

Result
Target Price
247 €/mt
Futures Result
176 €/mt
Sep19 contract
MW @ Mar19
L
159 €/mt
MW @ expiration
S
net
-/- 17 €/mt

13


Result with
HEDGING PRO
237 €/mt
SPOT
13 €/mt
FUT RESULT
250 €/mt
REALISED
247 €/mt
TARGET
€ 494.000 Budget
€ 6.000
1,2%
€ 500.000 To pay
Target Price Range
Standard deviation Sept = 16
[215 €/mt ; 279 €/mt]
250 €/mt

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Dairy Product 01

- Input product
- Close price relationship with Milk Powder and other dairy derivatives
  - Europe - EEX
  - New Zealand - NZX
  - Chicago – CME
- Taking liquidity into account
  - Non-fat dry milk – CME promising product

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Setup

Correlation

jan 2013- sep 2017
0,89
Non-Fat Dry Milk (NFDM) - CME

Basis

156 €/mt

Quantity – how much powder?
Broker says 1:1
1 contract = 20 mt
1000 mt = 50 contracts NFDM

Target Price

1720 €/mt	April18 contract NFDM @ sep 17
156 €/mt	Basis
	+
1876 €/mt	

1.000 mts @ 1 Sep 2017 for delivery April 2018

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Result

Target Price

1720 €/mt — April18 contract NFDM @ sep 17

156 €/mt — Basis

\+

1876 €/mt

Futures Result

-/- 387 eur/mt

	price USDc	total $ contract	ctrcts	total				
entry	92,66	40769	50	$2.038.457,14				
exit	71	31406	50	$1.570.297,14			fx	1,215
diff	21,28	9363		$ 468.160,00		386.909,09 €		387 €
				usd		eur		eur/mt

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Result

1560 €/mt (SPOT) + 387 €/mt (FUT RESULT) = 1947 €/mt (REALISED) ≠ 1876 €/mt (TARGET)

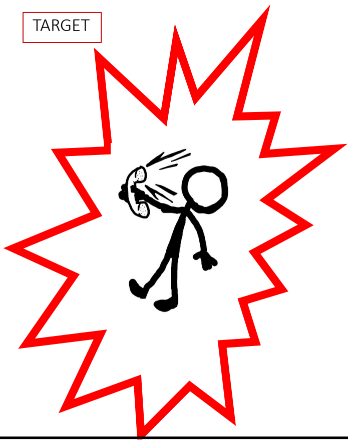
€ 1.876.000 **Budget**

€ 71.000

3,8%

€ 1.947.000 **To pay**

=



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What went wrong

Hedging **Ratio**	• Ratio = 0,8891 instead of 1
Correct number of **contracts**	• 44 vs. 50 contracts
Basis + **TP** range	• We did not use the month specific basis -> 233 €/mt instead of 156 €/mt

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Setup

Effectiveness

jan 2013- sep 2017
80%
Non-Fat Dry Milk (NFDI

Basis - APRIL

233 €/mt
Quantity – how much powder?
Use hedge ratio of 0,8891
1000 mt spot = (1000 x 0,8891) / 20 = 44

Target Price

1720 €/mt	April18 contract NFDM @ sep 17	
233 €/mt	Basis	+
1953 €/mt		

1.000 mts @ 1 Sep 2017 for delivery April 2018

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Result

Target Price

1953 €/mt

Futures Result

-/- 340 eur/mt

	price USDc	total $ contract	ctrcts	total				
entry	92,66	40769	44	$1.793.842,29				
exit	71	31406	44	$1.381.861,49			fx	1,215
diff	21,28	9363		$ 411.980,80		340.480,00 €		340 €
				usd		eur		eur/mt

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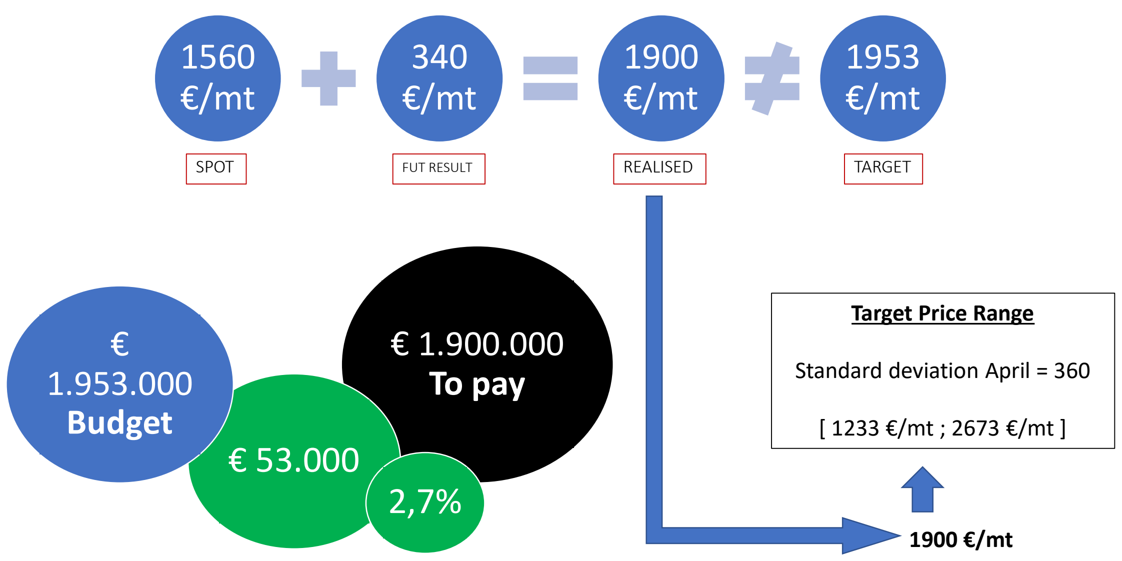
Result with HEDGING PRO



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commodity risk management Academy

Can we improve the result even more??

- With MULTIPLE PRODUCT HEDGE!!
  - Use more than one contract in a "basket"
  - Match spot price movement better
  - Technically more complex, but Hedging Pro solves this for us

Hedging Strategy	Hedging Effectiveness	Ticker	Hedge Ratio
Hedging Strategy 1	0,9098	Skim Milk Powder (NZX) - NEARBY	0,5241
Hedging Strategy 1	0,9098	Nonfat Dry Milk (CBOT) - NEARBY	0,341

SPH
- NFDM
- 80% effective

MPH
- NFDM + Skimmed Milk Powder (NZX)
- 92% effective

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New Target Price

- **New basis, standard deviation and TP**
  - Basis: 356 €/mt
  - St dev is smaller because more effective: 183 €/mt
  - TP = 1850 €/mt

multiple product hedge target price			
	euros/mt	hr	
nfdm	1720	0,341	586,52
smp	1730	0,5241	906,693
total			1493,213
		basis	356
		total	1849,213
		rounded	1850

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Futures Result

17 NFDM + 523 SMP = 1000 mt Dairy

April 2018 contract						
SMP		entry		euro's		
Sep-17	08/09/2017	$ 2.050,00		1.729,96 €		
Apr-18	average last 7 days	$ 1.906,86				
	Difference	$ 143,14	net loss			
			fx		contracts	total
		$ 143,00	1,215	117,70 €	523	**61.554,73 €**

NFDM	price USDc	total $ contract	ctrcts	total				
entry	92,66	40769	17	$ 693.075,43				
exit	71	31406	17	$ 533.901,03			fx	1,215
diff	21,28	9363		$ 159.174,40		**131.549,09 €**		132 €
				usd		eur		eur/mt

multiple product hedge result		
17 contracts	nfdm	131.549,09 €
523 contracts	smp	61.554,73 €
TOTAL		193.103,82 €
per mt		193,10 €

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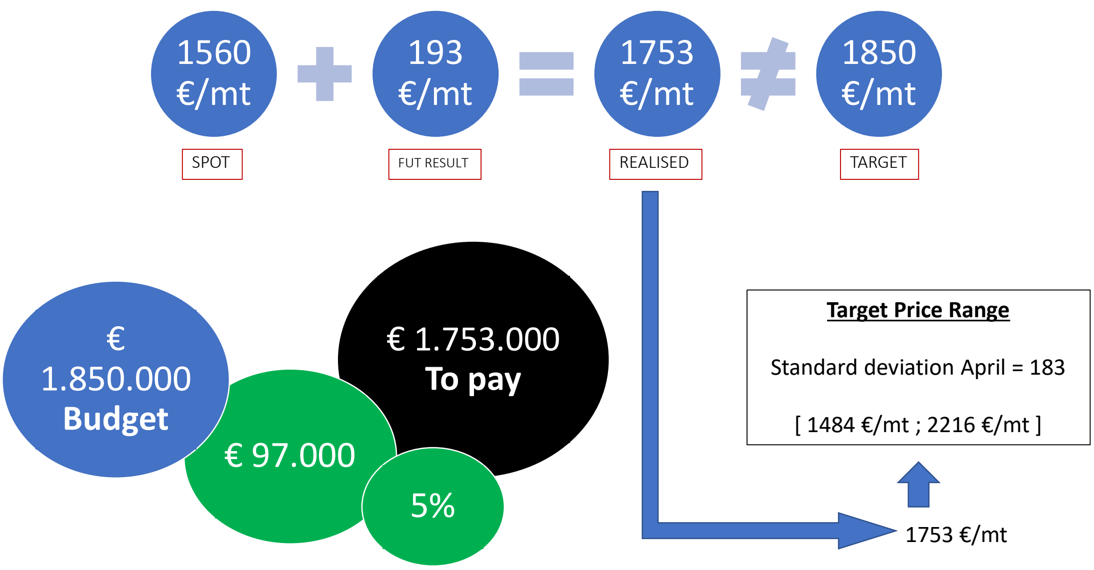
Result with HEDGING PRO



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Hedging Process with Hedging Pro

- Investigate
- Graph
- Hedging
- Basis
- Target Price

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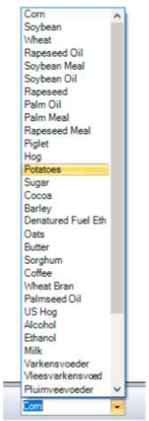

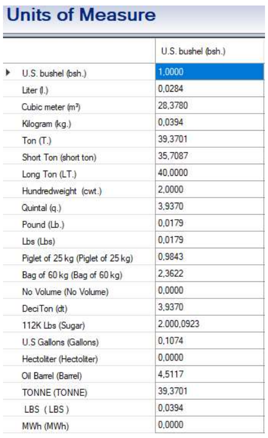
Units of Measure

	U.S. bushel (bsh.)
U.S. bushel (bsh.)	1,0000
Liter (l.)	0,0284
Cubic meter (m^3)	28,3780
Kilogram (kg.)	0,0394
Ton (T.)	39,3701
Short Ton (short ton)	35,7087
Long Ton (LT.)	40,0000
Hundredweight (cwt.)	2,0000
Quintal (q.)	3,9370
Pound (Lb.)	0,0179
Lbs (Lbs)	0,0179
Piglet of 25 kg (Piglet of 25 kg)	0,9843
Bag of 60 kg (Bag of 60 kg)	2,3622
No Volume (No Volume)	0,0000
DeciTon (dt)	3,9370
112K Lbs (Sugar)	2.000,0923
U.S Gallons (Gallons)	0,1074
Hectoliter (Hectoliter)	0,0000
Oil Barrel (Barrel)	4,5117
TONNE (TONNE)	39,3701
LBS (LBS)	0,0394
MWh (MWh)	0,0000

- Do I have a good Datamanager? -> HEDGING PRO DATABASE
  - Easily convert units
  - Take exchange rates into account
  - Compare exact data points

KEY QUESTIONS WHEN HEDGING

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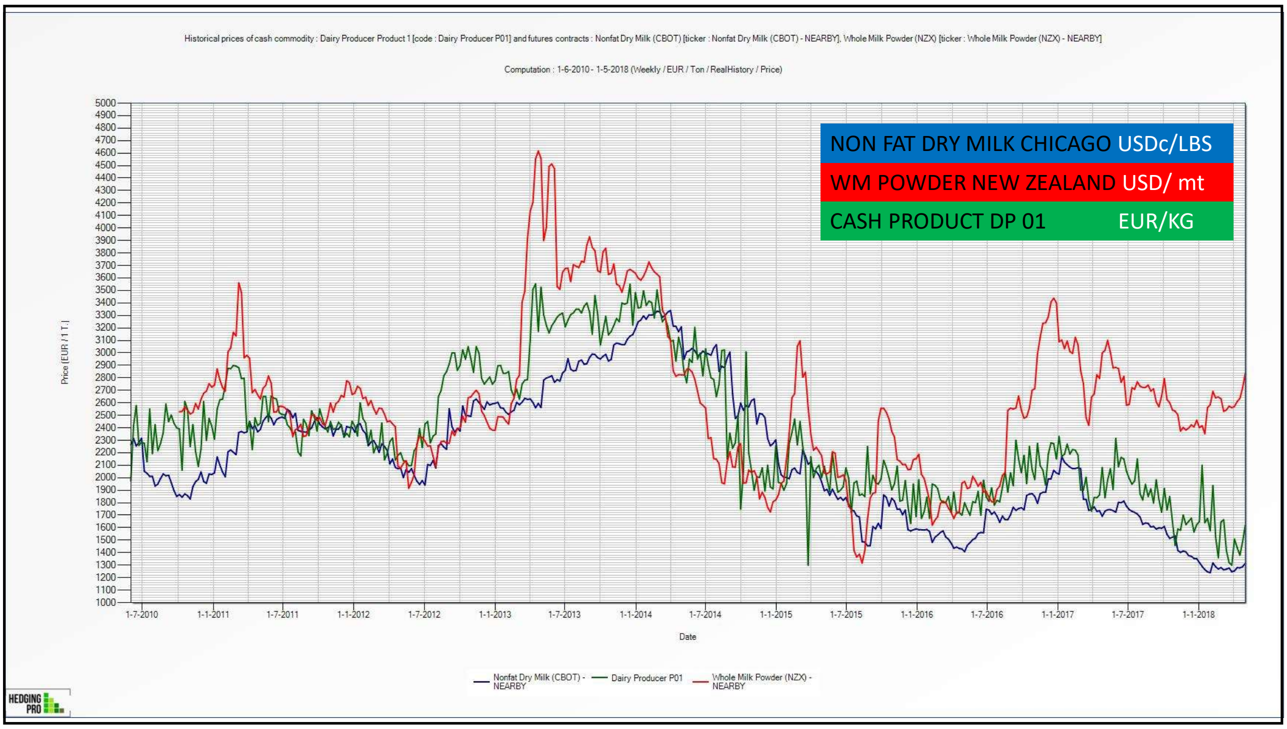

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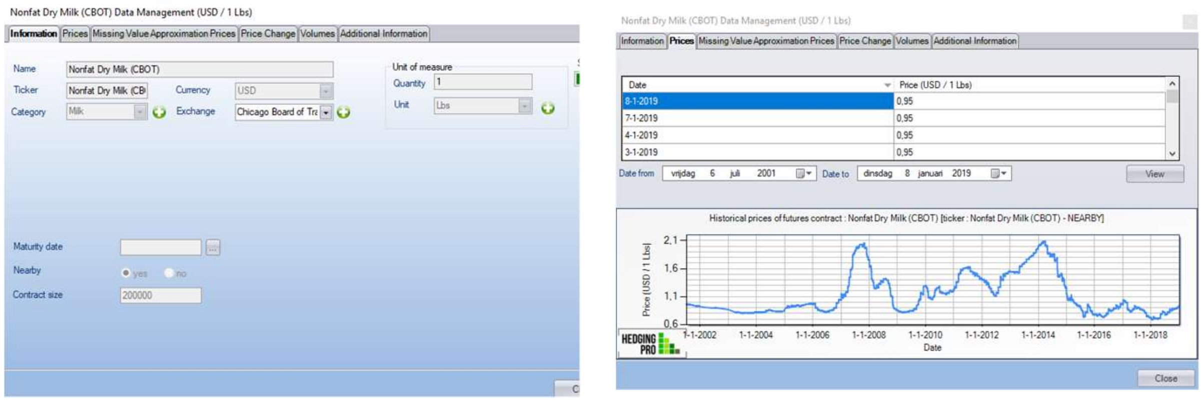

KEY QUESTIONS WHEN HEDGING

2. Which futures are available? → HEDGING PRO DATABASE
   - Automatic update of futures prices with data provider

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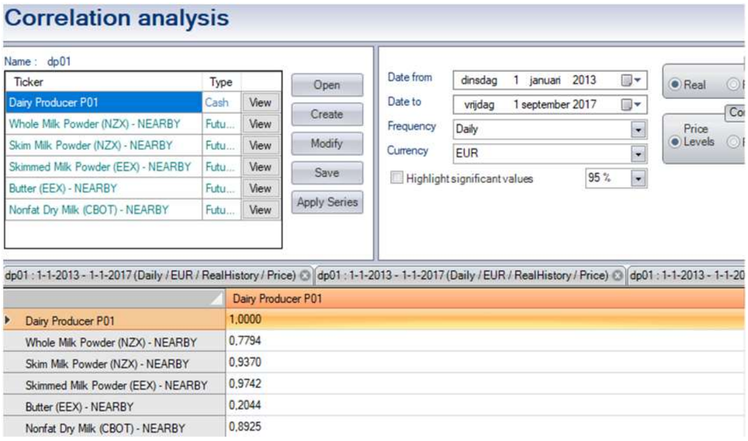

KEY QUESTIONS WHEN HEDGING

- 3. What's the relationship between the futures and spot market? → CORRELATION

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Sneak Preview

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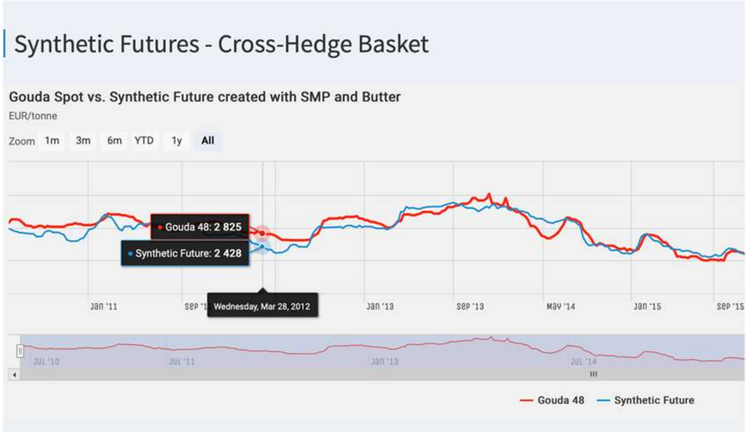

Dairy hedging dashboard – Gouda 48 EU

- Hedging Gouda 48 with smp and butter (eex)
- Dairyhedging.comrisk.nl

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Grain hedging dashboard - DDGS hedging

- Dried Distillers Grains with Solubles
  - Cereal Byproduct of distilling
  - In the U.S. people are not sure how to hedge it with corn, wheat, soybean meal
  - ddgs.comrisk.nl

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