ENABLING THE MALAYSIAN FEED INDUSTRY TO RISE TO THE GLOBAL INGREDIENT SUPPLY CHALLENGES

Matthew Clark, FeedGuys Resources Pte Ltd

education organization research

MALAYSIA BRANCH

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Challenges of the last three years

- Commodity prices have been very unstable
- FOREX is difficult to manage in many client countries
- Feed Cost is a major concern

- Also:

- How do we manage the formulation process reacting to the fluctuating raw material processes
- How do we connect purchasing, nutrition and profitability
- Has the management requirement changed in these new conditions

What practical yield are we seeking?

- Analysis of the practical application of KPI's in the feed business.. KPI Dangers:
  - Collide between departments
  - Have unintended consequences
  - Are not suitable to high levels of market fluctuation
  - Paradoxically, KPI's can raise the feed cost when the staff carry out their assigned tasks

- Nestle : Managing with KPI's is the art of catching people doing the right thing

- Introducing the 'WarGame' as a research tool and training aid
- Simulate one set of KPI's against another and measure the outcome as a point of proof

KPI's and challenges – SBM Price

KPI - Tracking SBM cost against the market	Outcome
Measure of the cost of SBM	Designed to measure and reward good purchasing timing and risk management (not subsets of an ingredient class)
Unintended Consequence	More expensive but relatively higher nutrient value ingredients can be rejected from the process. Instead of purchasing on nutrient value, the company purchases on either - Lowest cost of a commodity (by named class) - Protein content
Remedy – cost of protein ingredients formulated in a standard against a standard SBM formula as a benchmark	The assumption that low cost ingredients produce low cost feeds is not entirely true - Intelligent purchasing against market movements does save money - Purchasing cheap ingredients can exclude better value ingredients These two factors need to be separated

Shadow Pricing – the Value Indicator

NAME	Arg SBM 2020	Bra SBM 2020	USA SBM 2020
Crude Protein	45.50	**47.00**	46.40
AMEn Broiler	2015.42	2070.77	**2127.94**
Digestible Lys Poultry	2.42	2.44	**2.54**
Digestible Met Poultry	0.54	0.54	**0.56**
Digestible M&C Poultry	0.96	0.99	**1.06**
Digestible Thr Poultry	1.40	1.43	**1.46**
Digestible Trp Poultry	0.52	0.53	**0.56**
Digestible Ile Poultry	1.74	**1.81**	1.79
Digestible Val Poultry	1.82	1.84	**1.89**
Digestible Arg Poultry	2.90	3.02	**3.04**

M.A. Ibáñez, C. de Blas, L. Cámara, G.G. Mateos 2020
AMEn Broiler Recalculated using CVB 2019
For precision, current data in each time period should be used

Shadow Prices SBM

Arg SBM – US$ 633/MT

Bra SBM – US$ 653/MT

USA SBM – US$ 675/MT

Shadow Prices express commercial value independently of Crude Protein and show value of full nutrient content

Cheapest may not be the most economically efficient

KPI's and challenges – Feed Costs

KPI - Lowest feed cost	Outcome
Measure of the cost of formula against an annual budget or historical cost	Feed cost is critical and needs to be budgeted or maintained - good in itself but it needs a more sophisticated methodology. The VC trap is to consider absolute feed cost to be controllable
Unintended Consequence	Puts unrealistic pressure on the cost of feed and leads to noticeable compromise - In rising markets the formula is under undue pressure - In falling markets, the formula may be undetectably over specification and financially inefficient
Remedy – Establish a benchmark specification and compete against it Benchmarking technique – a WarGame element	Enables a direct, current, evaluation of a formula cost and to detect over formulation in a falling market as well as successful trimming in a rising market that would otherwise go unnoticed

KPI's and challenges – FCR – Side Note

KPI - Best FCR	Outcome
Measure of FCR as an indicator of financial success	Good FCR is assumed to be a measure of a good feed and good financial success in the making.
Unintended Consequence	This is true comparatively between flocks on the same feed as an indicator of the comparative efficiency of one farm against another. However pursuit of FCR can raise costs Company Chairman – A nutritionist will spend US$ 3-4 per tonne of feed building their reputation using MY money!
Remedy – focus on cost of livestock production	Optimal formula density can change and should be evaluated to produce the best dollar or nutrient conversion. A better measure is ADG or bodyweight for age

KPI's and challenges – Crude Protein – Side Note

KPI - Best Cost of Protein	Outcome
Measure of Crude Protein as a parameter for best protein supply	Crude protein content can be taken as a benchmark for value ($/Lb Crude Protein)
Unintended Consequence	Purchasing ingredients that are low in amino acids and also probably low in energy
	Some protein ingredients are also high in energy, which the protein calculation will not recognize
Remedy – focus purchasing total SID amino acids through the formulation system	The formulation system will evaluate the complete nutrient profile to determine full spectrum nutrient value

Crude Protein Does not Indicate Total Amino Acid Content

	SBM	Canola	Yeast	MBM	Corn	Wheat	DDGS
Lys	2.81	1.78	2.55	2.03	0.23	0.30	0.81
Met	0.62	0.68	0.58	0.55	0.16	0.16	0.55
Cys	0.66	0.82	0.35	0.46	0.17	0.23	0.52
Thr	1.80	1.47	1.84	1.38	0.27	0.30	1.01
Trp	0.62	0.48	0.46	0.26	0.06	0.13	0.22
Arg	3.38	2.09	1.70	3.23	0.36	0.50	1.24
Ile	2.11	1.36	1.73	1.24	0.25	0.34	0.98
Leu	3.53	2.37	2.67	2.56	0.88	0.67	3.07
Val	2.20	1.74	2.06	1.86	0.35	0.43	1.30
His	1.21	0.91	0.82	0.70	0.22	0.23	0.71
Phe	2.36	1.39	1.60	1.45	0.35	0.45	1.31
Tyr	1.75	1.08	1.42	1.42	0.28	0.30	1.11
Gly	1.97	1.74	1.63	6.41	0.29	0.42	1.09
Ser	2.32	1.44	1.91	1.91	0.35	0.46	1.29
Pro	2.35	2.12	1.62	4.06	0.66	0.94	2.14
Ala	2.01	1.49	2.39	3.30	0.55	0.37	1.93
Asp	5.28	2.43	3.53	3.19	0.50	0.54	1.77
Glu	8.32	5.87	4.91	5.26	1.33	2.68	4.59
Total AA	45.30	31.26	33.77	41.27	7.26	9.45	25.64
Crude Protein	46.47	34.82	39.07	46.77	7.45	10.05	27.24
% of CP	97.5%	89.8%	86.4%	88.2%	97.4%	94.0%	94.1%

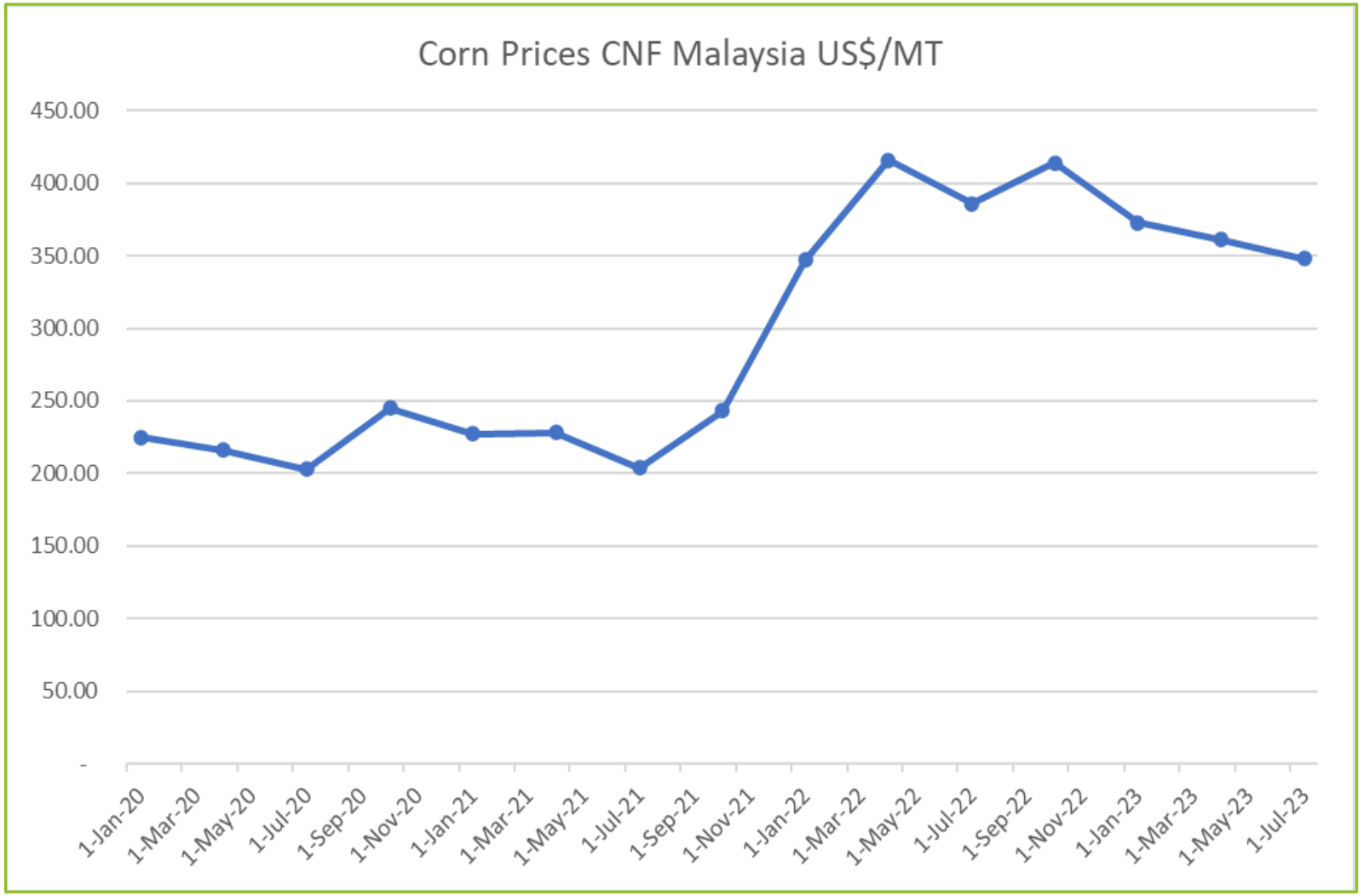
These are the amino acid contents of selected feedstuffs

Total amino acid content as a % of crude protein is not constant

SBM is relatively high with a total amino acid content at 97.5% of crude protein

Yeast is relatively low with a total amino acid content 86.4% of crude protein

What have we faced - Corn



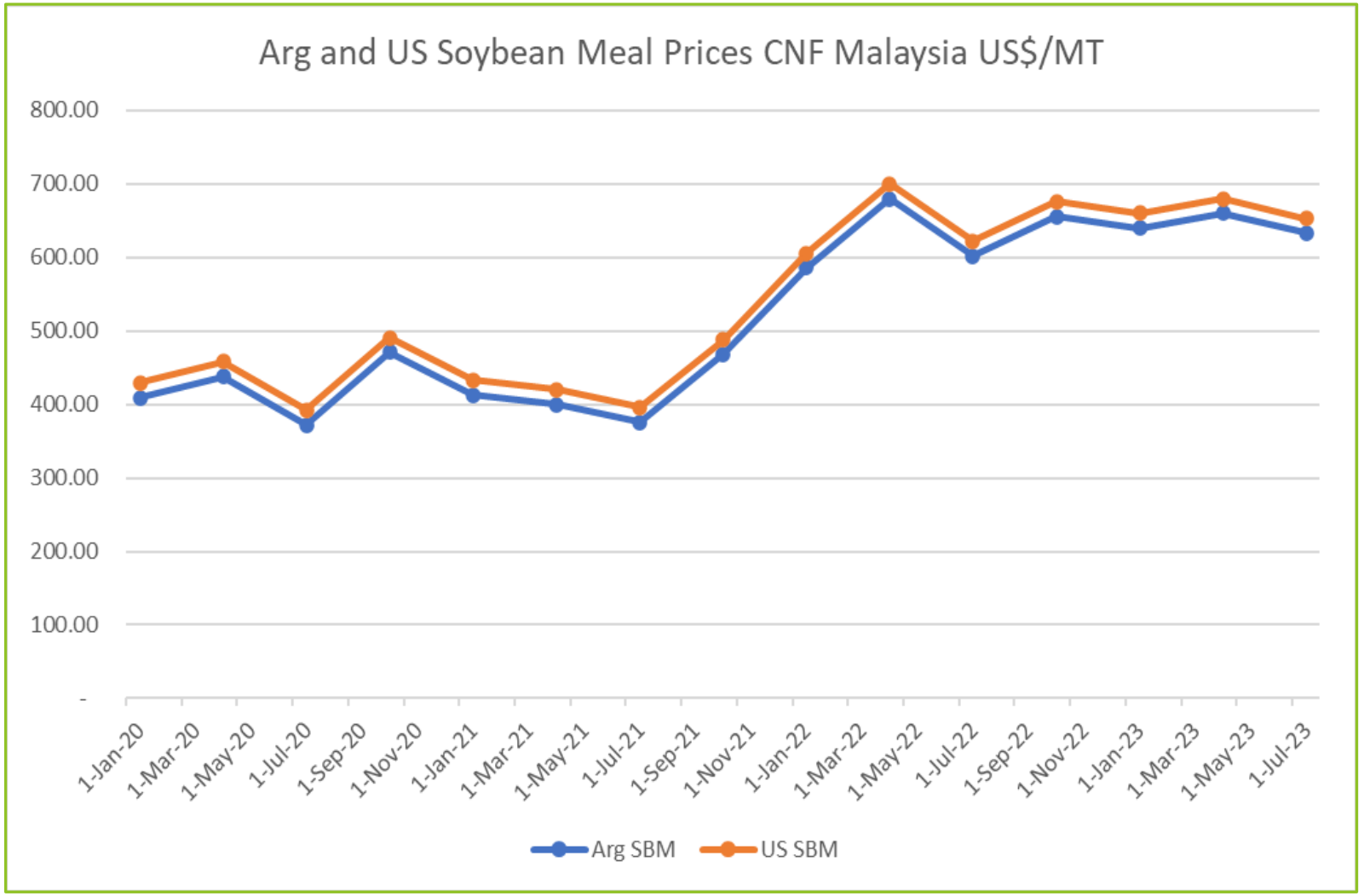
Delivered price of corn has doubled between July 2021 and May 2022

ENERGY in the feed has become expensive

High density feed ingredients are preferred

Energy evaluation of ingredients is critical

What have we faced – Soybean Meal

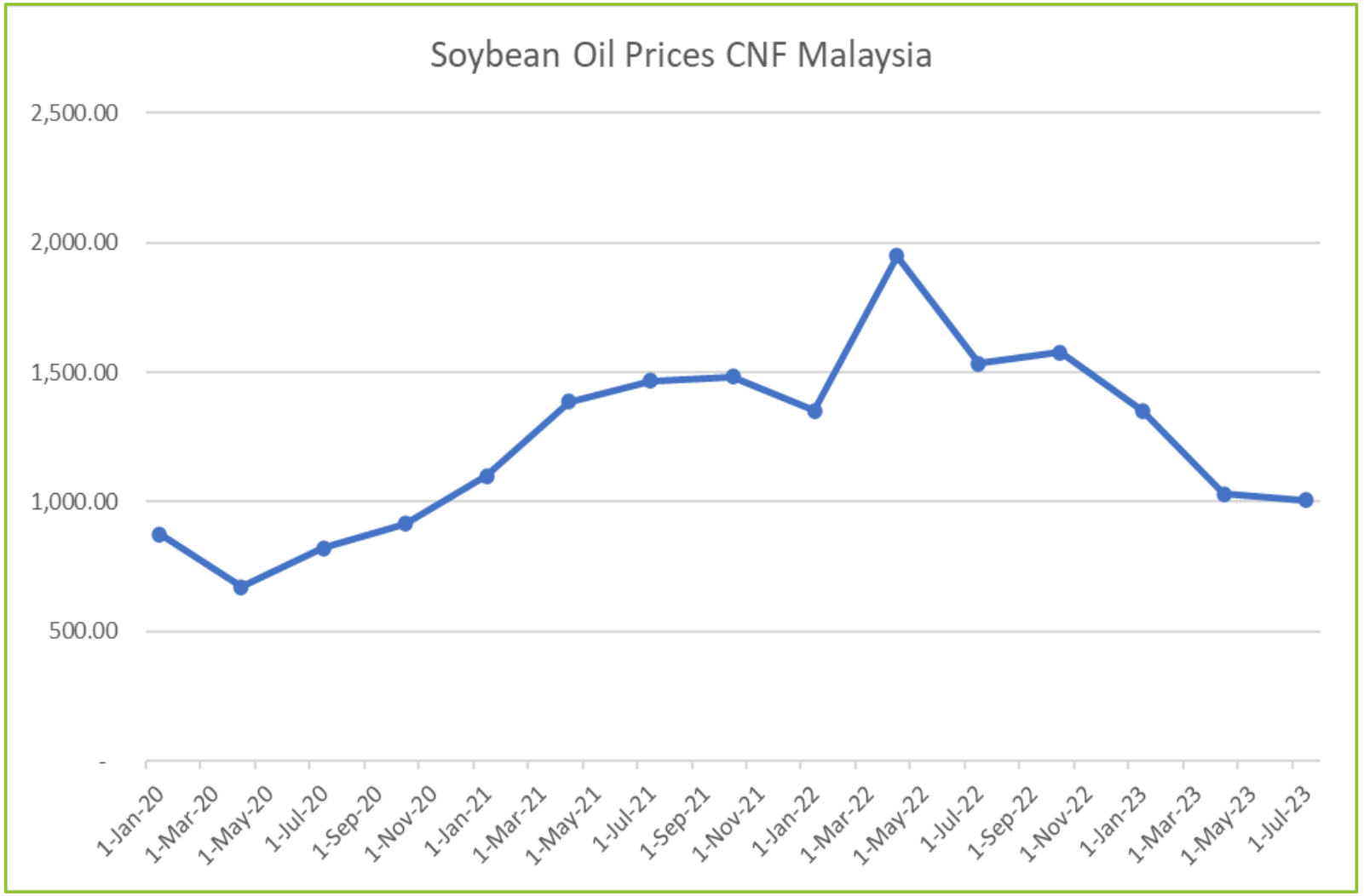


Soybean meal has increased in price since July 2021

Is currently fairly stable, but still consistently high, and likely to remain at these levels – but who can predict

Two prices to be studied with US SBM set at a premium of US$ 20 over the Arg SBM market

What have we faced – Soybean Oil



Oil prices jumped severely partly due to harvesting challenges during COVID.

Price of competitive fats in some countries still exceeds US$ 1,000 per tonne

Significant driver in the composition of formulas, low fat, higher AA feeds are now in the market

WarGame Setup – Two Teams (and a financial controller

Team 1	Team 2
KPI - Purchase SBM based on price	KPI - Purchase SBM for lowest feed cost
Options of either Arg or US SBM. US SBM priced US$ 20 per MT above the Arg SBM market price	Options of either Arg or US SBM. US SBM priced US$ 20 per MT above the Arg SBM market price
Pass the purchases to nutrition to do their best	Use the same formula specification to generate a feed with the same nutrient content at each stage in the game
Use the same formula specification as Team 2	Pass the ingredient requirements back to
Measure cost of SBM purchases	Measure cost of formula
Critique for company profitability	Critique for company profitability

Purchasing Evaluator - Demonstration, CBH Group Australia

File Edit Optimise View Tools Help

Spec Plant	Evaluator 1 Base Pl	Spec	SIM202B	Med Pack	Test Medpak Br 1 Non Med	Optimise	Post Opt 0.073888 Se
Spec Class	POULTRY	Spec Full	202 Cobb Pre Starter B	Batch	100.00 Kgs		Optimal 0.015044 Se
Price Set	AUS Jul 2022	Spec		Tonnes	Not Selected		

Nutrient	Full Name	Minimum	Actual	Maximum	Statu	Rest	Previc
WEIGHT	Weight	1.000	**1.000**	1.000	MAX	-153.16...	1.
PROT...	Crude Protein	0.000	19.848	25.000			20.
MEP	AMEn Poultry	0.000	2,961....	4,000.000			2,992.
MEPB	AMEn Broiler	2,950.000	**2,950....**	3,950.000	MIN	0.131756	2,950.
CFAT	Crude Fat	0.000	4.491	11.000			5.
FIBRE	Crude Fibre	0.000	2.748	5.000			2.
XANTH	Xanthophyll	0.000	13.271	20.000			12.
CA	Calcium	0.840	**0.840**	0.890	MIN	5.083359	0.
APHOS	Av Phos (Poultry)	0.400	**0.400**	100.000	MIN	44.0373...	0.
NA	Sodium	0.220	**0.220**	0.240	MIN	20.3267...	0.
CL	Chloride	0.000	**0.250**	0.250	MAX	-8.604120	0.
DLYS-P	Digestible Lys Po...	1.280	**1.280**	100.000	MIN	26.5506...	1.
DMET-P	Digestible Met Po...	0.483	0.688	100.000			0.
DMnC-P	Digestible M&C P...	0.954	**0.954**	100.000	MIN	31.9200...	0.
DTHR-P	Digestible Thr Po...	0.870	**0.870**	100.000	MIN	20.5425...	0.
DTRP-P	Digestible Trp Po...	0.209	**0.209**	100.000	MIN	248.586...	0.
DILE-P	Digestible Ile Pou...	0.808	**0.808**	100.000	MIN	92.3792...	0.
DVAL-P	Digestible Val Po...	0.933	**0.933**	100.000	MIN	41.3588...	0.
DARG-P	Digestible Arg Po...	0.000	1.134	100.000			1.

Ingredien	Var	Full Name	Minimum	Actual	Maximur	Statu	Not	Price	Stock	Rest	Prev
CORN		Yellow Corn	0.000	50.908	100.0...		☐	361.000	☑		47.5
WHEAT		Wheat 10%	0.000	**10.000**	10.000	MAX	☐	341.000	☑	-0.12...	10.(
WHEA...		Wheat Aus with ...	0.000	0.000	60.000		☐	432.000	☐		0.(
SBM		Base SBM	0.000	0.000	100.0...		☐	660.000	☐		0.(
SBMA...		Arg SBM 2020	0.000	0.000	100.0...		☐	660.000	☑		29.
SBMB...		Bra SBM 2020	0.000	0.000	100.0...		☐	660.000	☐		0.(
SBMU...		USA SBM 2020	0.000	26.852	100.0...		☐	670.000	☑		0.(
FFS		Full Fat Soya	0.000	0.000	5.000		☐	772.000	☑		0.(
DDGS		DDGS BASE	0.000	**6.000**	6.000	MAX	☐	420.740	☑	-0.15...	6.(
OIL-SOY		Oil, Soybean	0.000	1.387	6.000	MAX	☐	1,030.000	☑	-0.00...	2.4
LIME		Limestone	0.000	1.273	100.0...		☐	40.000	☑		1.3
MDCP		MDCP	0.000	0.759	100.0...		☐	770.000	☑		0.7
SALT		Salt	0.000	0.129	100.0...		☐	103.000	☑		0.7
BCARB		Bicarb	0.000	0.572	100.0...		☐	355.000	☑		0.5
LLYS		L-Lysine HCl	0.000	0.518	100.0...		☐	1,750.000	☑		0.4
DLMET		DL-Methionine	0.000	0.408	100.0...		☐	2,975.000	☑		0.4
LTHR		L-Threonine	0.000	0.271	100.0...		☐	1,860.000	☑		0.2
LILE		L- Isoleucine	0.000	0.093	100.0...		☐	8,900.000	☑		0.(
LVAL		L-Valine	0.000	0.131	100.0...		☐	3,900.000	☑		0.7
PHYT...		Phytase 500 g 10...	0.049	**0.050**	0.050	MAX	☐	6,000.000	☑	-51.7...	0.(
NSPA...		NSP Enzyme Ge...	0.049	**0.050**	0.050	MAX	☐	4,000.000	☑	-256....	0.(
XANT...		Xanthophyll Premix	0.000	0.000	1.000		☐	9,300.000	☑		0.(

Feasible	Current Cost	514.4086
Feasible in 101 Iterations	Previous Cost	523.5334
Optimal in 8 Iterations	Change Cost	-9.1249

Data Dir	C:\LPData\Evaluator
Reading	Evaluator1
Writing	Evaluator1

Soybean Meals Compared -

NAME	Arg SBM 2020	Bra SBM 2020	USA SBM 2020
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M.A. Ibáñez, C. de Blas, L. Cámara, G.G. Mateos 2020
AMEn Broiler Recalculated using CVB 2019
For precision, current data in each time period should be used

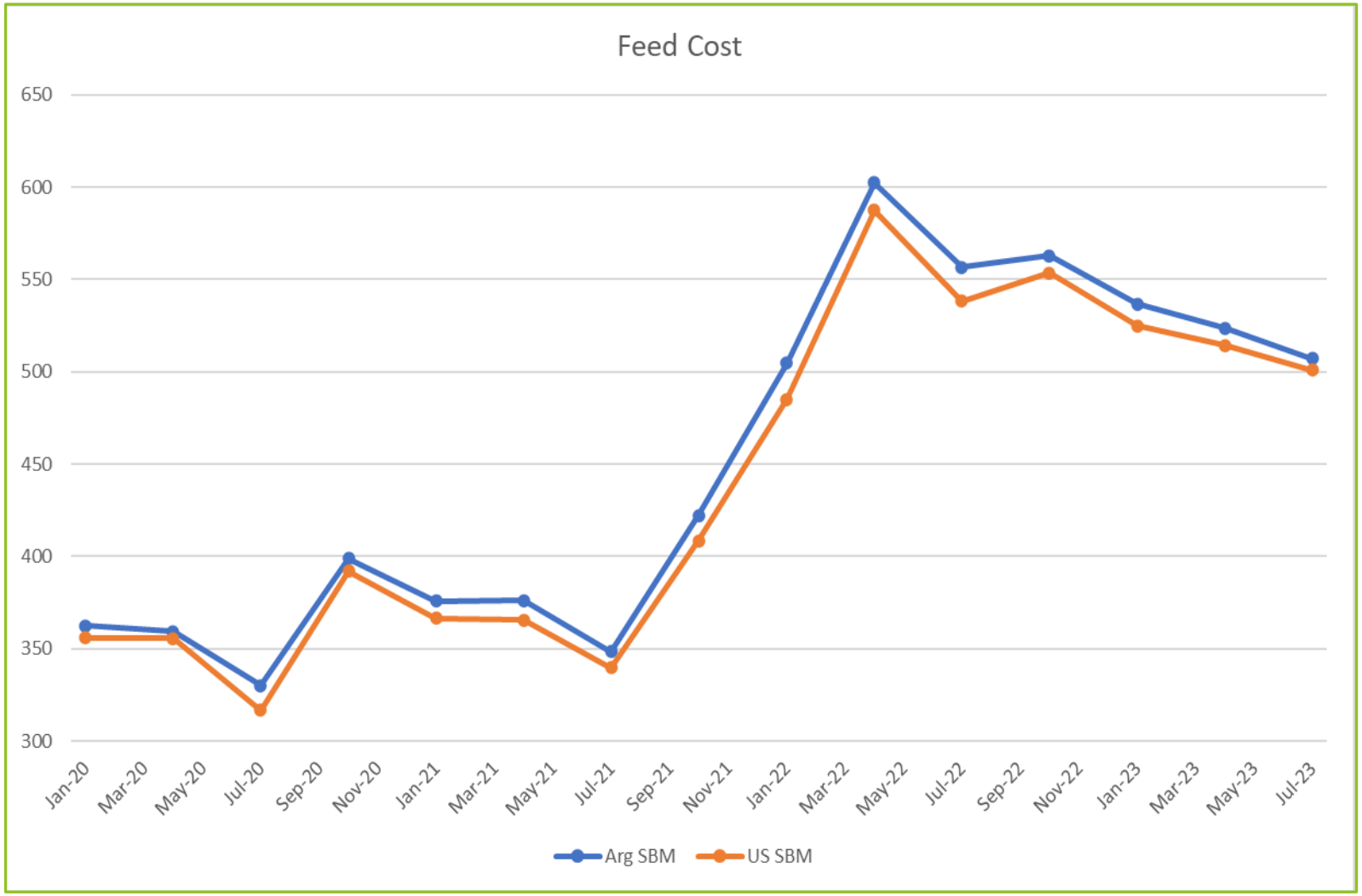
Red values indicate best in each line

Although the Bra SBM has the highest crude protein the SID AA are lower than US SBM

Energy is a very expensive nutrient. The energy value of the SBM fraction is critical in a formula

US SBM has the highest AMEn from the three alternatives

Jump to the Feed Cost Answer

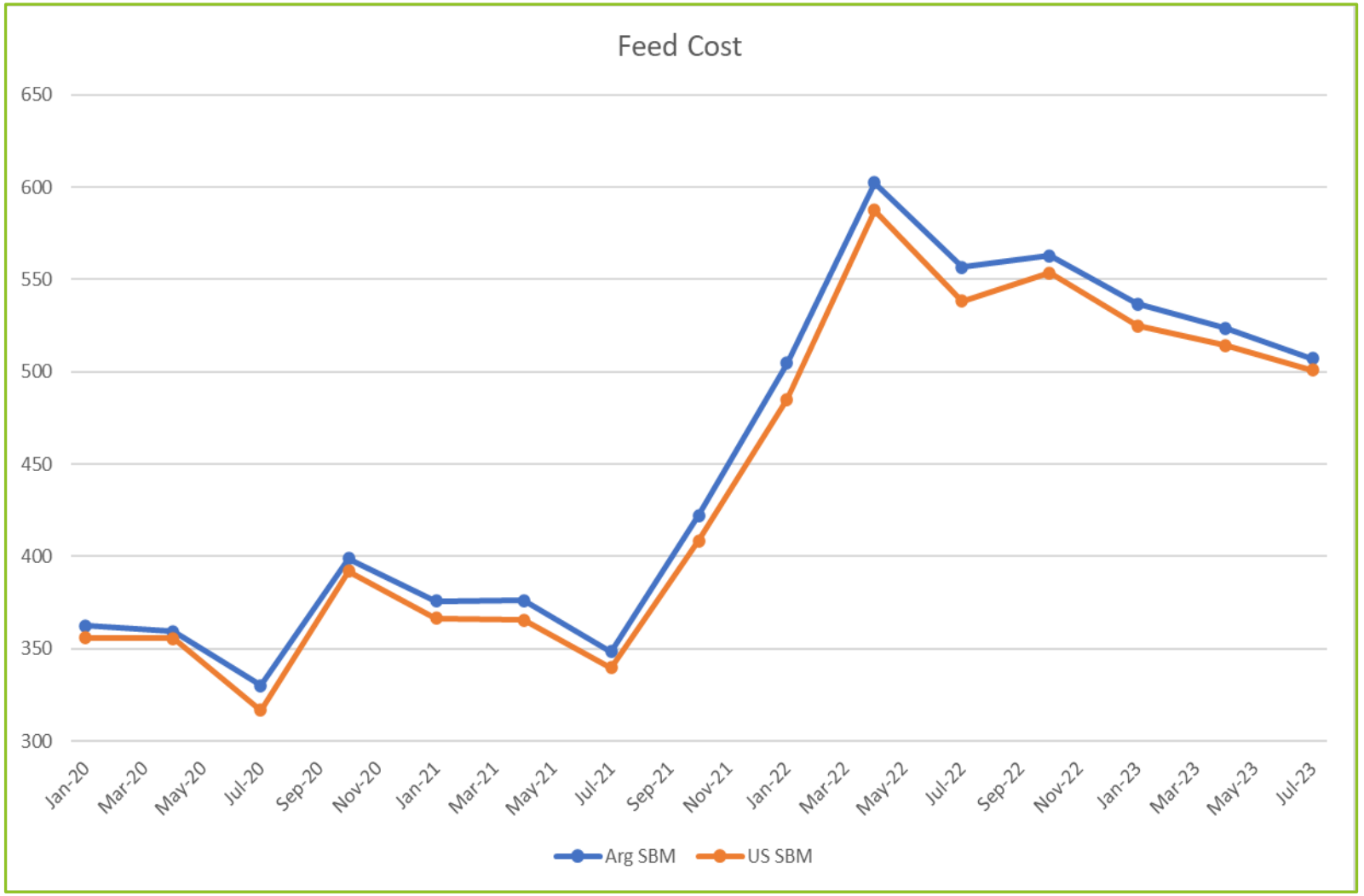


Feed cost is shown for the Arg SBM diet compared to the US SBM diet

US SBM is priced at US$20 per tonne higher

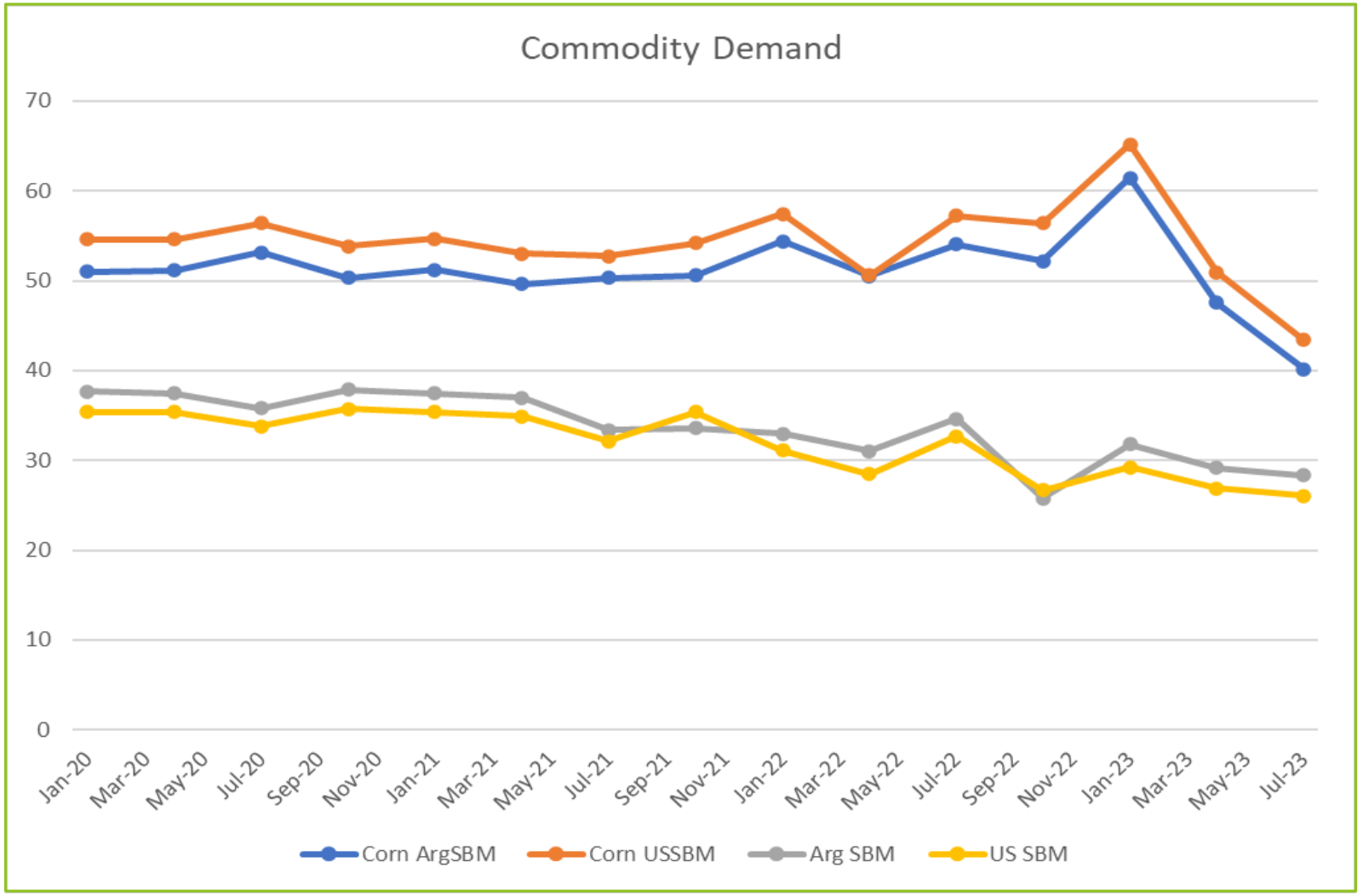
Feed cost is lower on the US SBM formulas for all the time periods and market conditions

Feed Cost savings are clear in all time periods



	Arg SBM	US SBM	Saving
Jan-20	362.62	355.87	6.75
Apr-20	359.46	355.59	3.87
Jul-20	330.15	316.70	13.45
Oct-20	399.02	392.11	6.91
Jan-21	376.02	366.49	9.53
Apr-21	376.28	365.66	10.62
Jul-21	348.65	339.88	8.77
Oct-21	422.25	408.57	13.68
Jan-22	504.66	484.99	19.67
Apr-22	602.23	587.38	14.85
Jul-22	556.65	538.37	18.28
Oct-22	562.69	553.36	9.33
Jan-23	536.79	524.77	12.02
Apr-23	523.53	514.42	9.11
Jul-23	507.04	500.98	6.06

Components - SBM and Corn Purchases – Arg SBM v. US SBM



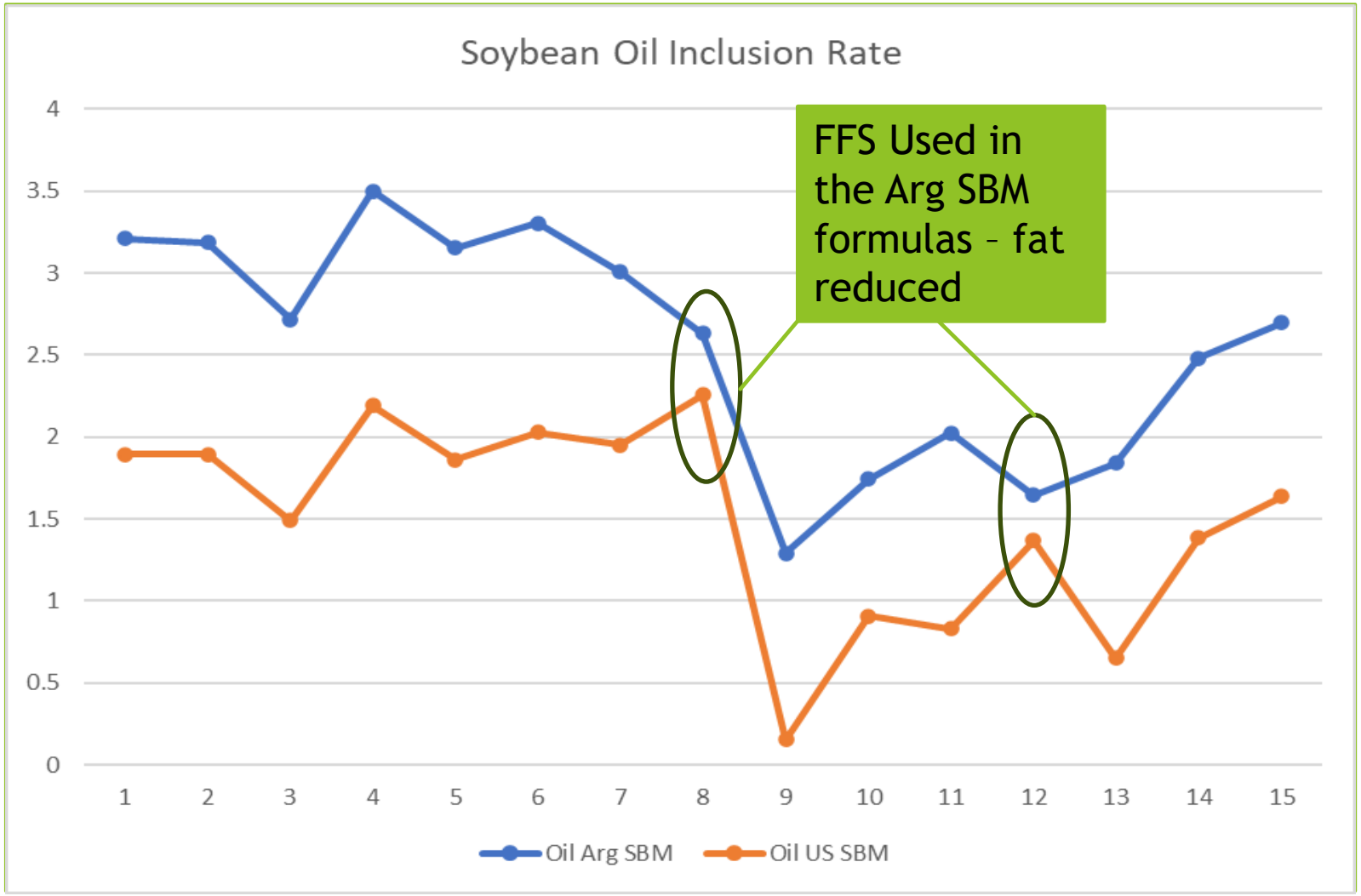
Formulas based on US SBM have higher inclusion rates of corn in all the price situations.

Higher corn is an indicator of a lower cost formula

Inclusion rate of US SBM is mainly lower than the usage of Arg SBM

Some Arg SBM formulas use Full Fat Soya when the US SBM Formula does not

Components - Soybean Oil Purchases- Arg SBM v. US SBM



Corn in the US SBM formulas is usually higher

US SBM has a higher AMEn value

More energy is supplied by the key components

Fat supplementation is less in the US SBM formulas

Savings in fat inclusion are major contributors to feed cost reduction

Components – Cost of Proteins Analysis

	Jul-21	Oct-21	Jan-22	Apr-22	Jul-22	Oct-22	Jan-23
SBM Arg Protein Cost	125.46	157.30	**193.37**	**211.26**	**208.38**	169.14	**203.27**
FFS	-	26.16	43.39	55.76	31.65	31.65	-
Amino Acid	26.20	21.25	20.73	19.82	20.79	31.10	37.36
	151.67	**204.71**	**257.49**	**286.85**	**260.83**	**231.89**	**240.63**
SBM US Protein Cost	**127.31**	**172.84**	188.69	199.23	203.16	**180.41**	192.87
FFS	-	-	43.39	55.76	31.65	-	-
Amino Acid	24.08	20.90	20.30	18.63	20.30	35.57	40.06
	151.39	193.74	252.38	273.62	255.11	215.98	232.93
Saving Per Tonne	0.28	10.97	5.11	13.23	5.71	15.91	7.70

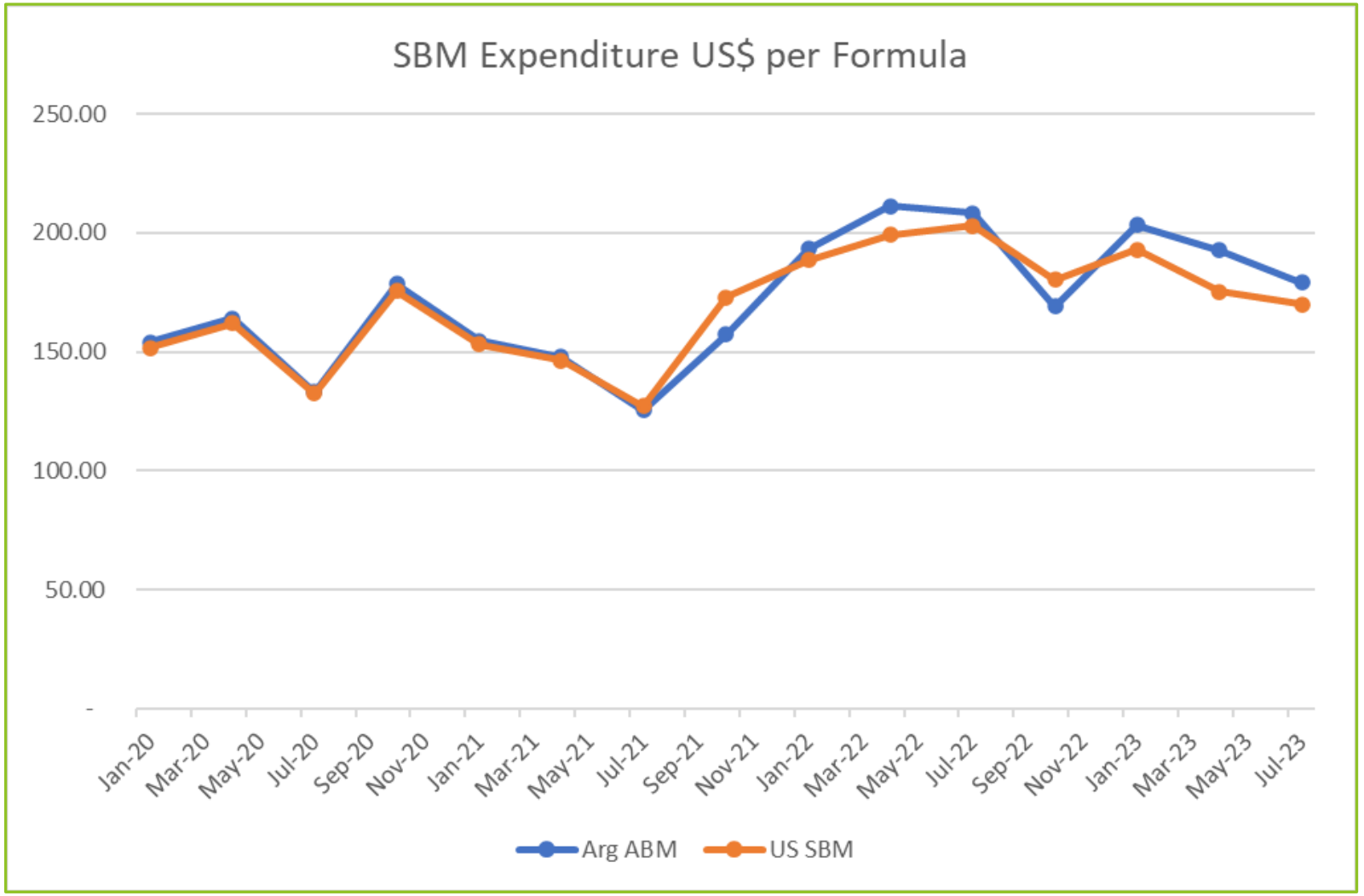
The inclusion rates of SBM vary so sometimes the total cost of Arg SBM is higher than US SBM, sometimes lower

FFS comes into the formulas but not at the same time necessarily

Supplemental AA costs are similar

Savings in protein source costs work out to be cheaper in each time period

Components - Soybean Meal Expenditure- Arg SBM v. US SBM

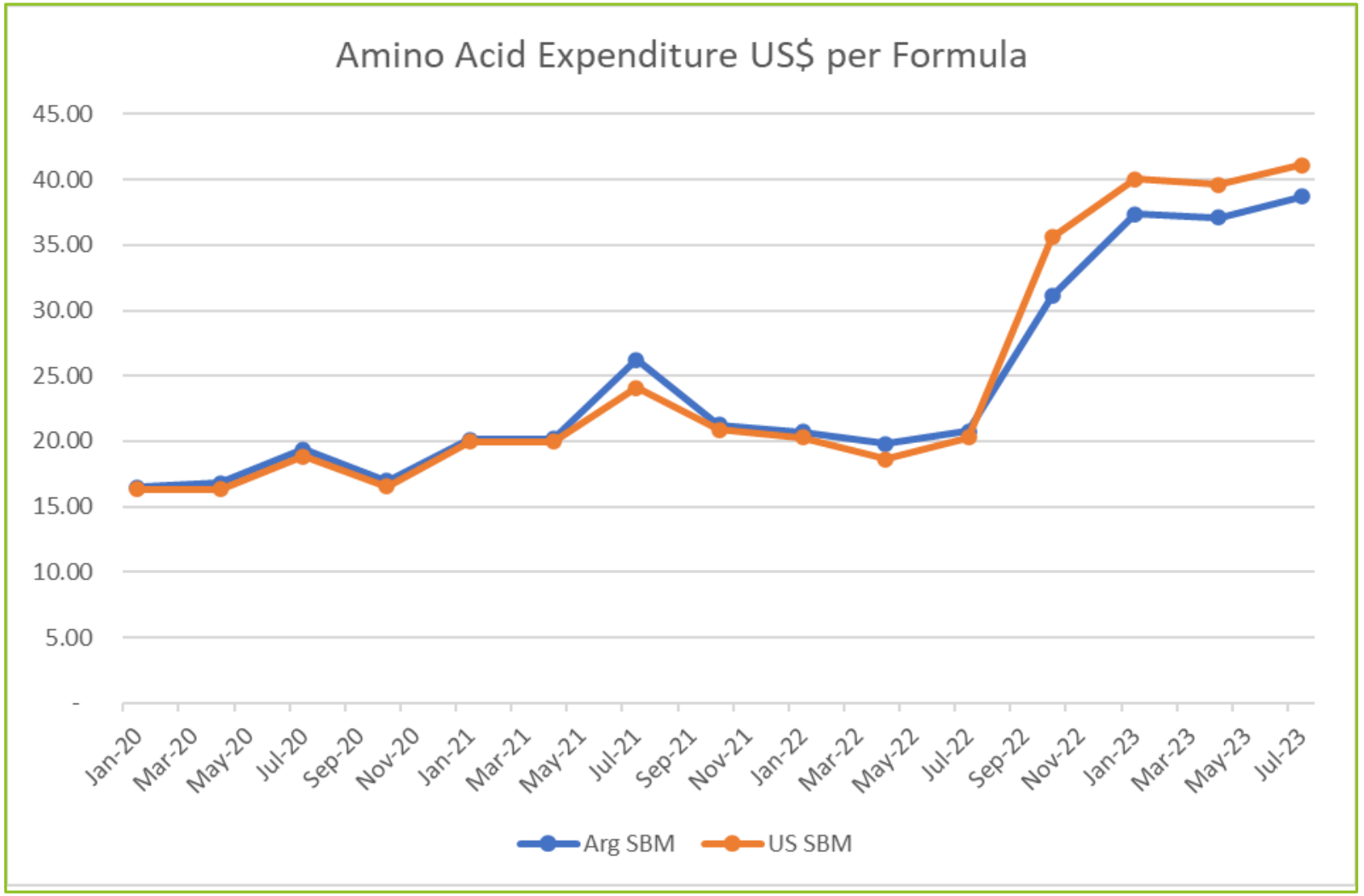


Although the two SBM's are priced differently, the expenditure in the first phase on SBM is roughly equal

When the oil price rises, Arg SBM expenditure increases

Less US SBM with more supplemental amino acid is used

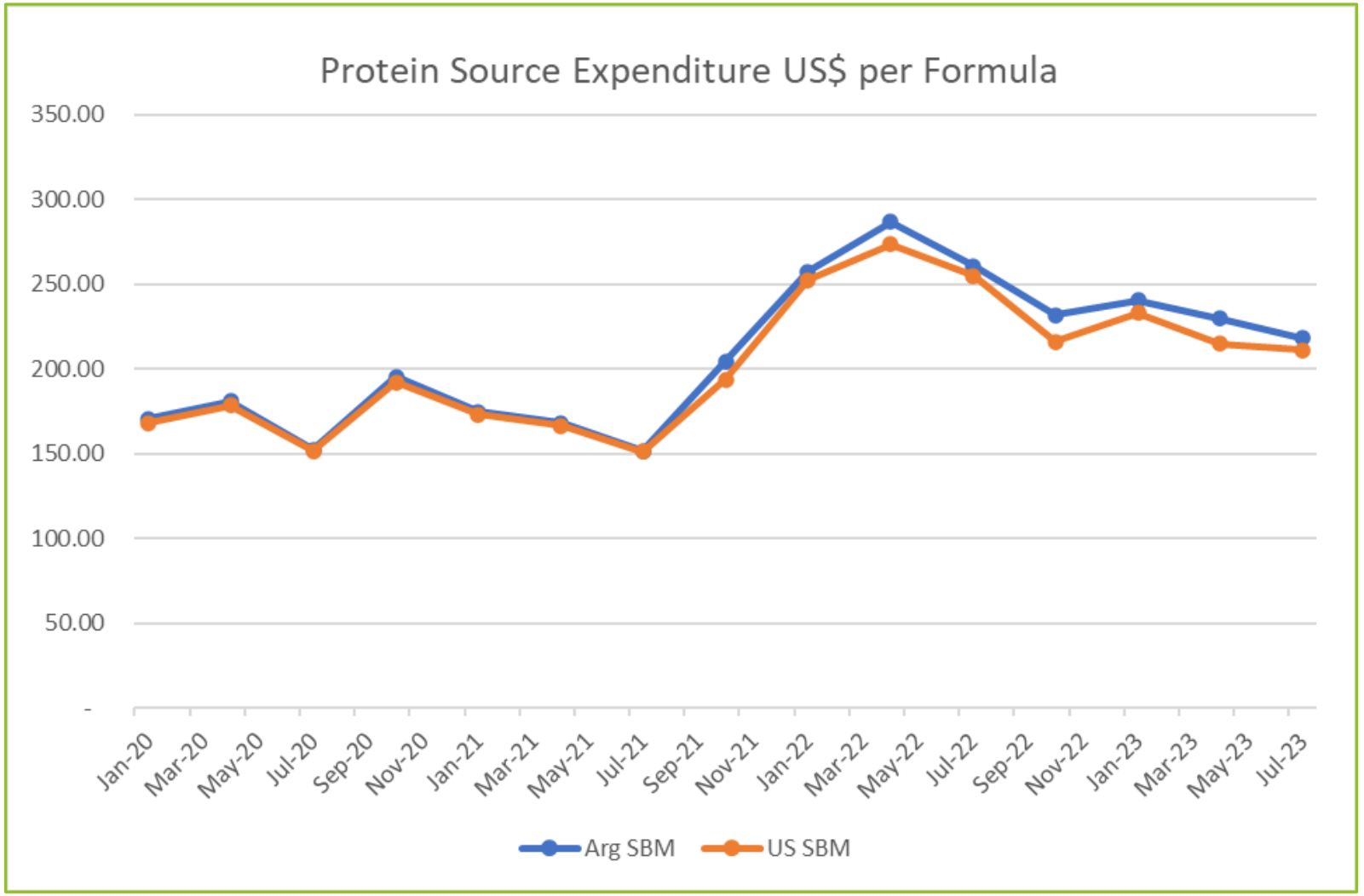
Components - Soybean Oil Purchases- Arg SBM v. US SBM



The least cost combination changes during the high oil price phase

Lower High Density AA Source from SBM saves energy in combination with AA supplementation

Components – Protein Source Expenditure (Approx)



This is an estimate of protein source cost

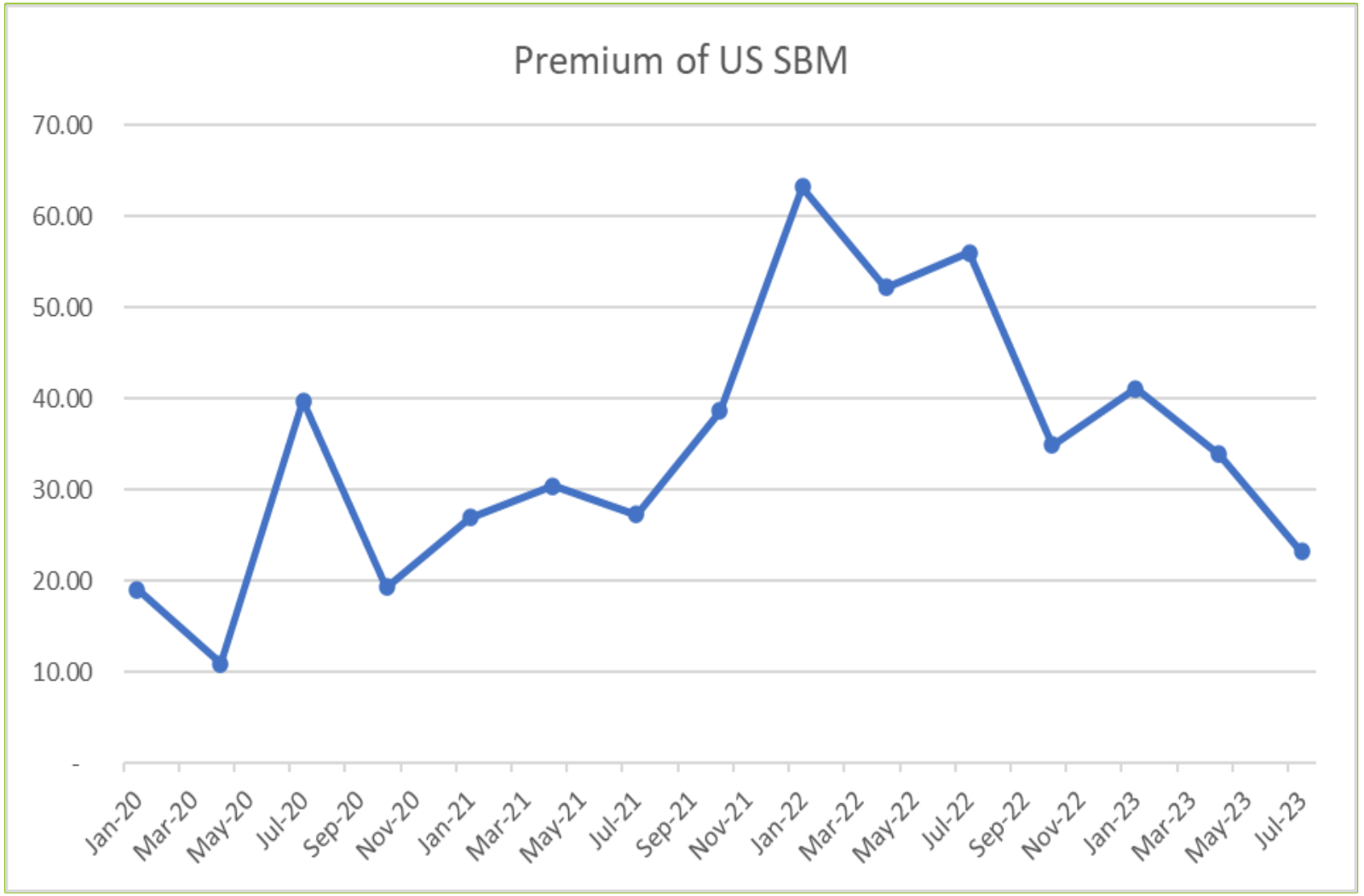
SBM

FFS

Supplemental AA

Overall the cost of proteins calculates out to be lower with US SBM, especially in the high oil price conditions

Premium of US SBM and Arg SBM

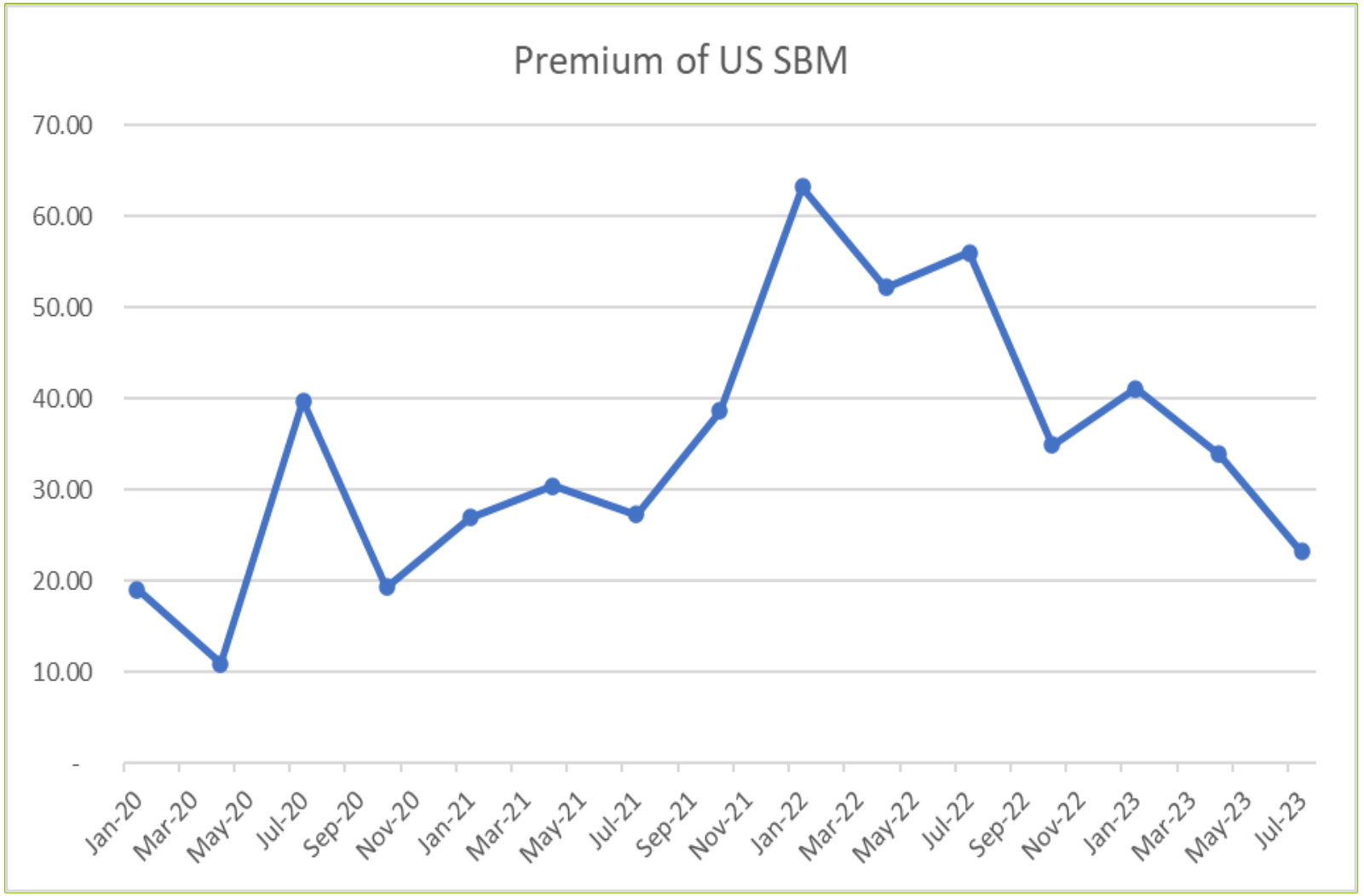


US v Arg SBM premiums vary according to the market conditions

Premium may be expressed differently in the formula range. Multi formula is preferred

What are the drivers

Premium of US SBM and Arg SBM



US v Arg SBM premiums vary according to the market conditions

Premium may be expressed differently in the formula range. Multi formula is preferred

What are the drivers?

Sources of the US SBM Premium ($ per tonne v Arg SBM)

Correlation between SBM price and Premium is relatively weak

R2 0.2477

Correlation between Soy oil price and premium is higher

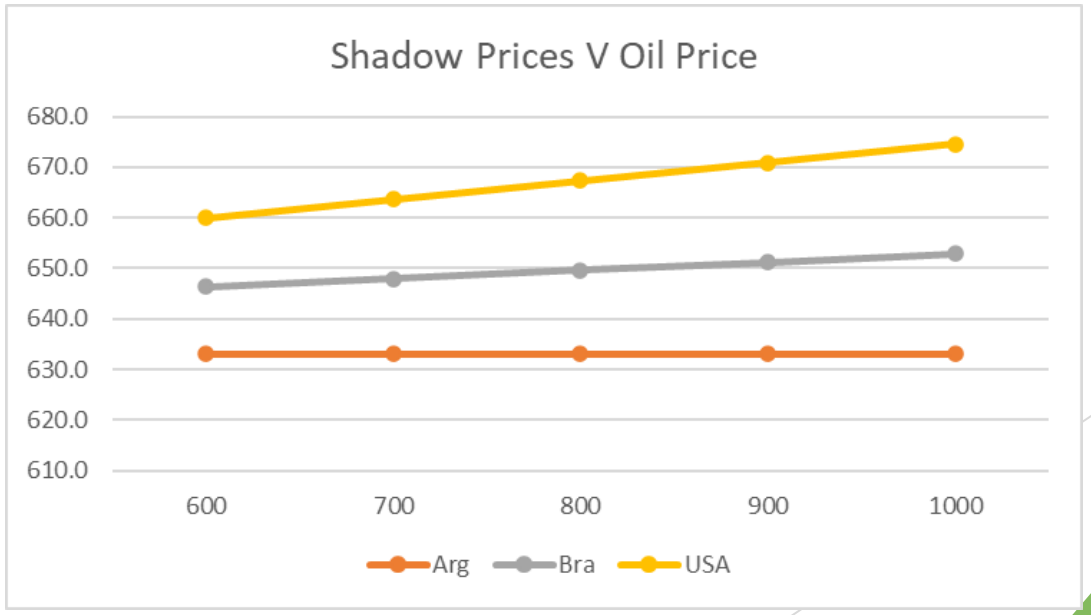
R2 = 0.6387

Energy cost is a significant driver of SBM value

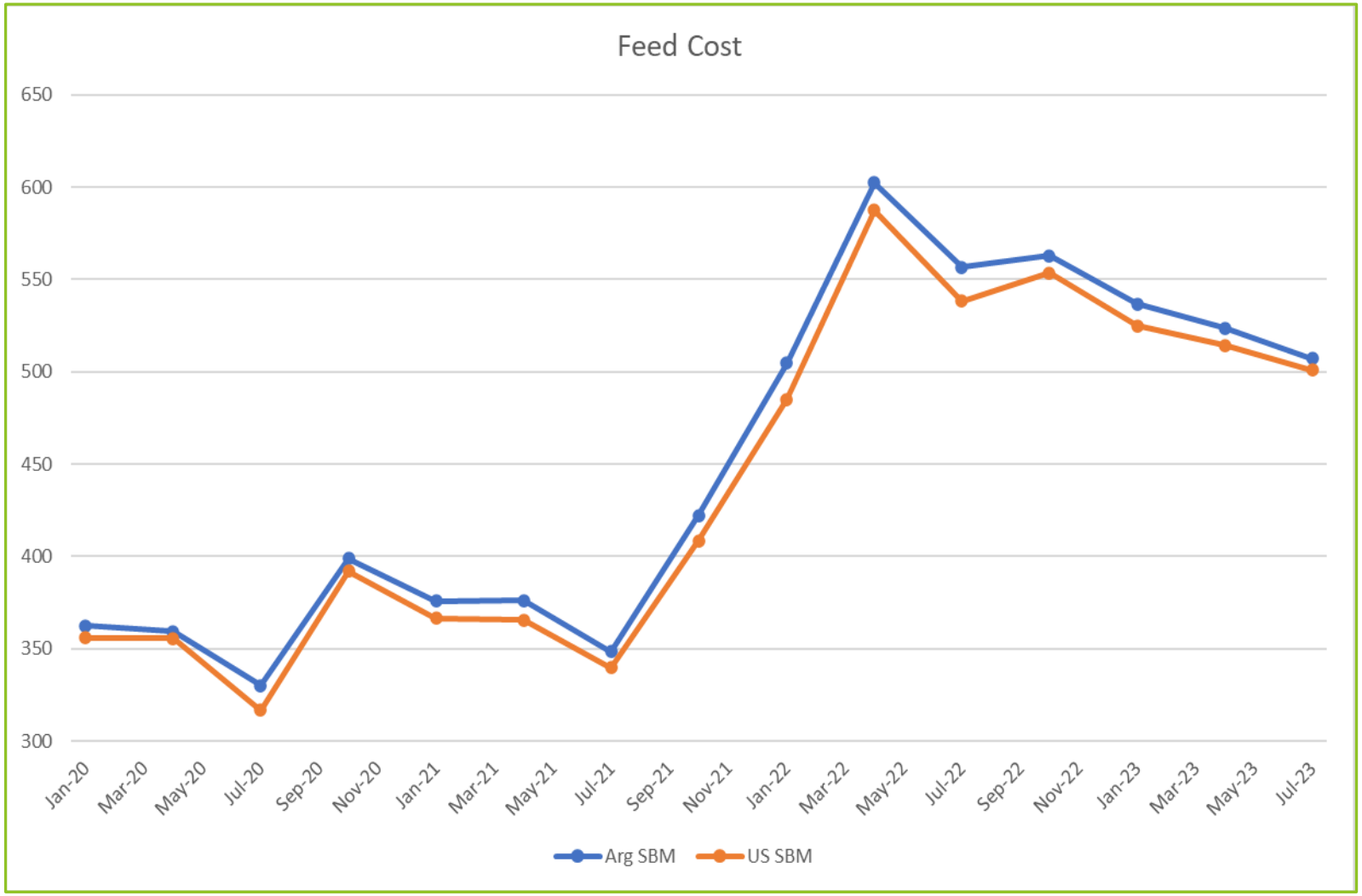
Fat Price v SBM Shadow Price

Base Formula		
Name	Inclusion	Price
Yellow Corn	49.6140	348.0
Wheat 10%	0.0000	1000.0
Base SBM	32.4040	633.0
Bra SBM 2020	0.0000	1000.0
USA SBM 2020	0.0000	1000.0

Soy Oil Price					
500	600	700	800	900	1000
352.384	348.442	344.501	340.559	336.618	332.676
633.000	633.000	633.000	633.000	633.000	633.000
644.714	646.337	647.960	649.584	651.207	652.830
656.311	659.966	663.620	667.274	670.928	674.582



Net Effect – Feed Cost is Consistently Lower



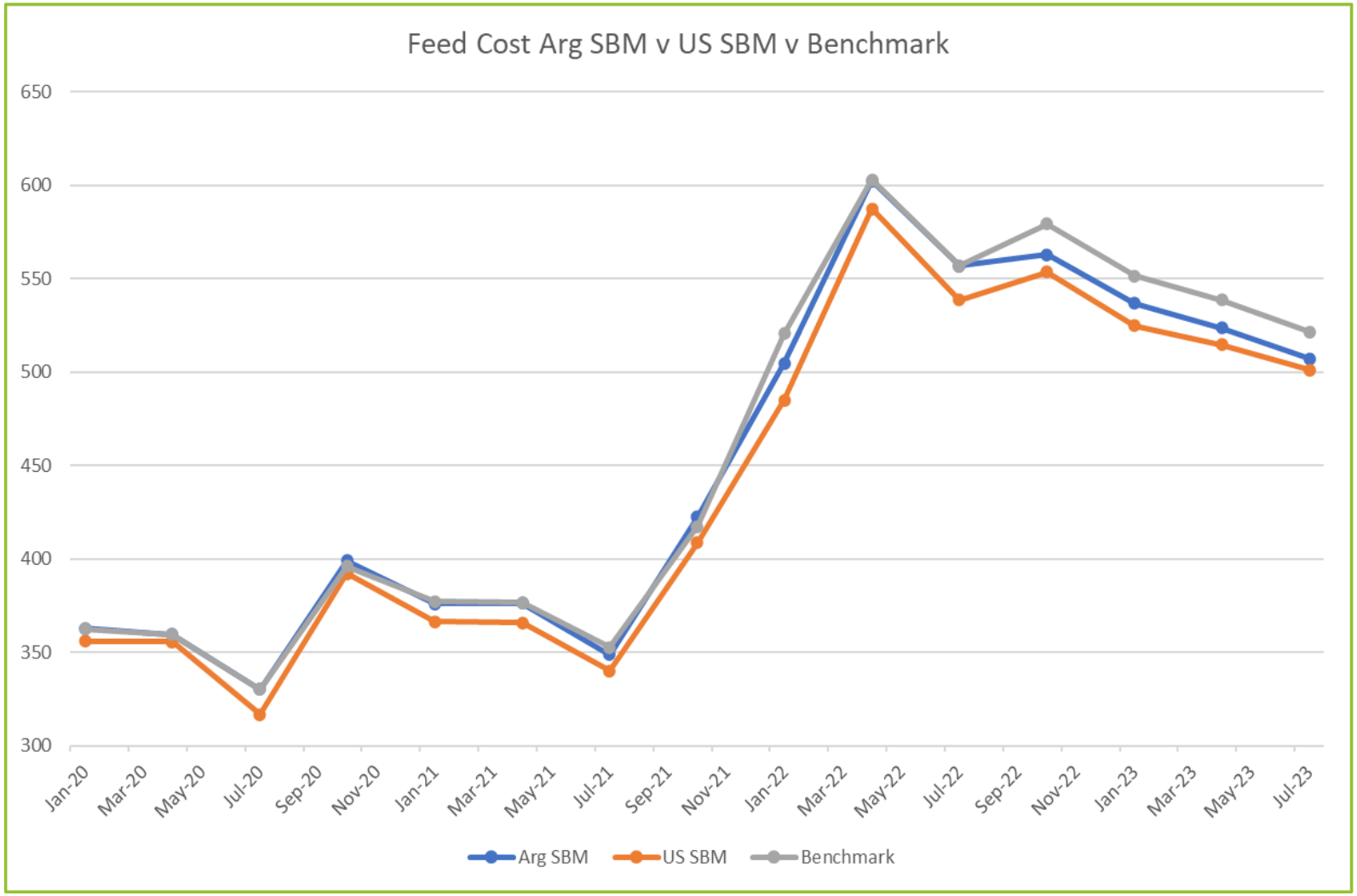
Feed cost is shown for the Arg SBM diet compared to the US SBM diet

US SBM is priced at US$20 per tonne higher

Feed cost is lower on the US SBM formulas for all the time periods and market conditions

Lower feed cost drives improved profitability

Benchmarks Show Financial Performance



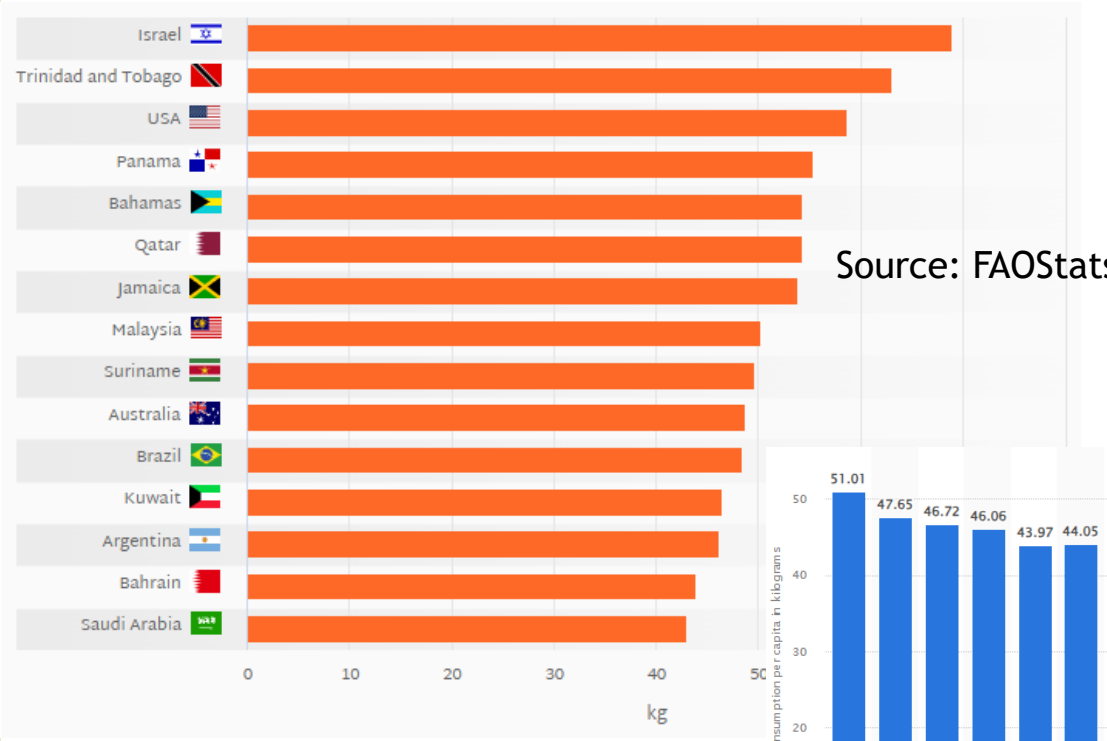
Comparison of formulas to the benchmark shows nutritionists relative performance

Variables here include

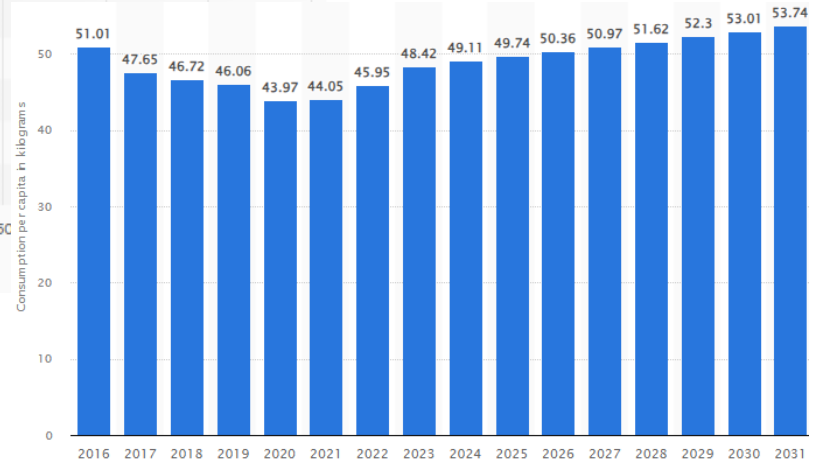
- Enzyme usage
- Varying usage of DDGS
- FFS Availability
- Use of wheat in Sepp 2022 0nwards

Benchmarks are the key to understanding relative feed costs

Poultry Meat Consumption in Malaysia Continues to Rise



Source: FAOStats April 2023



Source: Statista 2023

The feed costs have adjusted to high grain prices – not much choice

The cost of poultry has risen correspondingly

Malaysia impact on consumption is minimal. Consumption has peaked at 50.3 Kgs per capita

Conclusions – Wargame as a Training Aid

- Running simulations is a good way to evaluate an ingredient – precise commercial responses to situations with precise and constant nutrient delivery
- Profitability can be tested leading to a more sustainable business
- In the training context there are advantages to the WarGame
  - Practice in live formulation competitively
  - Repeated calculations in the study reinforce learning
  - Students learn accountability to the Game Controller/Board of Directors
  - Students learn to make a business case to their team and modify their working environment to advantage
  - Enables students to 'feel' commercial as well as technical pressures
- The WarGame works well as a training aid in different levels
  - Good technical and commercial practice for students
  - Good formulation and purchasing training for commercial key accounts
  - Enables the message of profitability to be broadcast
- The WarGame is a good environment to test drive different KPI set ups