

Amino acid content in fishmeal shows high variation

How does it affect the value of fishmeal?

**FIAAP, Bangkok
March 5th 2008**

**Dr. Torben Gosvig Madsen
Director, Technical Service
Evonik Degussa (SEA) Pte. Ltd.
Feed Additives**

Background



The main contributors to nutrient variation and the need for increased safety margins in compound feed are:

- Inconsistent feed mixing (within batch)**
- Raw material variation (batch to batch)**

Variation is additive

Agenda



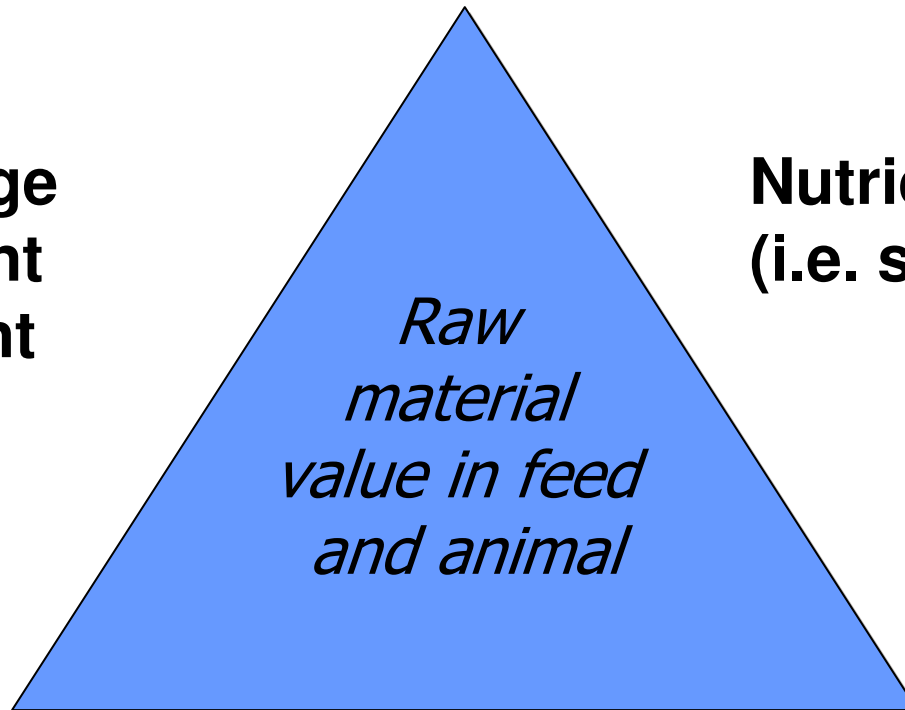
- Raw material value
- Management of raw material variation
- Saving potential

The value of raw materials in feed formulation is defined by 3 main factors



**Average
nutrient
content**

**Nutrient variation
(i.e. safety margin)**



**Raw material
cost per ton**

Analysis of South American and Indian fishmeal as an example

Crude protein (CP) and amino acid content In Indian & South American fish meal.



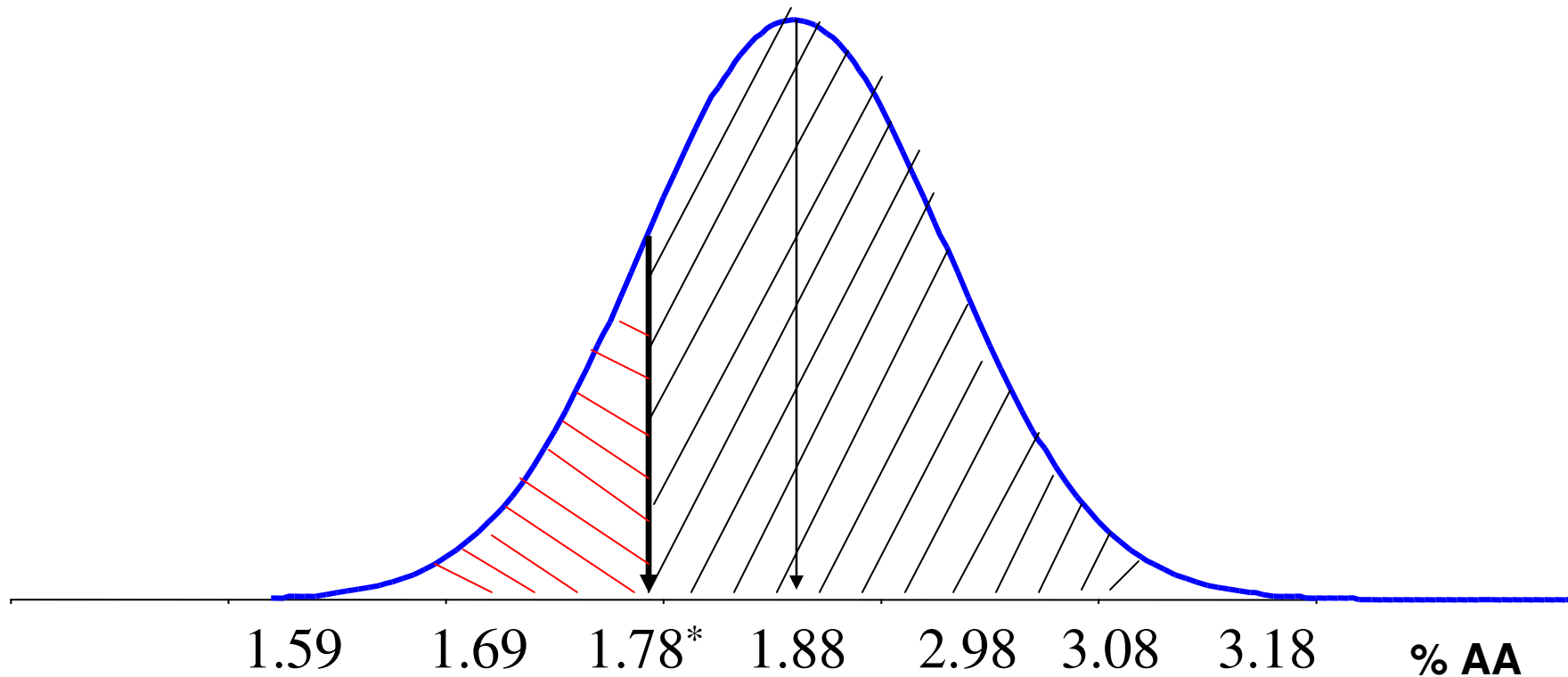
Fish Meal				
	Peru/Chile (N=56)		India (N=83)	
	Mean	CV	Mean	CV
DM standard, %	91		91	
CP, %	67.0	3.3	52.3	14.5
total amino acid (% as is)				
MET	1.88	5.1	1.12	28.1
M+C	2.48	5.2	1.59	26.4
LYS	5.20	4.6	2.95	24.5
THR	2.76	4.0	1.78	22.3
TRP	0.79	4.9	0.45	20.1
ARG	3.78	4.6	2.62	24.3
ILE	2.80	4.4	1.87	21.3
LEU	4.88	3.8	3.25	21.7
VAL	3.27	3.8	2.27	22.3

Crude protein (CP) and amino acid content In Indian & South American fish meal.



Fish Meal				
	Peru/Chile (N=56)		India (N=83)	
	Mean	CV	Mean	CV
DM standard, %	91		91	
CP, %	67.0	3.3	52.3	14.5
amino acid content in CP (% of CP)				
MET	2.80	3.7	2.12	21.6
M+C	3.70	3.8	3.01	18.1
LYS	7.76	2.9	5.62	16.5
THR	4.11	2.4	3.39	12.5
TRP	1.18	4.8	0.83	13.5
ARG	5.64	2.9	4.99	17.5
ILE	4.18	2.9	3.56	13.3
LEU	7.28	2.5	6.18	12.3
VAL	4.88	2.4	4.32	11.7

Safety Margin



*** 1 Std Dev. = 83%probability that batch contains at least the stated nutrient content**

Amino acid content with and without safety margin (1/2 standard deviation)



Fish Meal				
	Peru/Chile (N=56)		India (N=83)	
	Mean	Mean - 1/2 std.	Mean	Mean - 1/2 std.
DM standard, %		91		91
CP, %	67.0	65.9	52.3	48.5
total amino acid (% as is)				
MET	1.88	1.83	1.12	0.96
M+C	2.48	2.41	1.59	1.38
LYS	5.20	5.08	2.95	2.59
THR	2.76	2.70	1.78	1.59
TRP	0.79	0.77	0.45	0.41
ARG	3.78	3.69	2.62	2.30
ILE	2.80	2.74	1.87	1.67
LEU	4.88	4.79	3.25	2.90
VAL	3.27	3.21	2.27	2.02

Broiler diet formulation



Ingredients	Price (US\$/MT)	Composition (g/kg)	Nutritional composition (g/kg)	
Corn	220	542	Crude protein	240
SBM, 48%	420	302	Crude fat	52
MBM, 48%	386	77	Crude fiber	29
DDGS	240	15	Ash	55
Soybean oil	886	50	ME (kcal/kg)	3000
DL-Methionine	3500	3.15	TFD Lys	13.1
L-Lysine HCL	1600	3.05	TFD Met	5.9
L-Threonine	2500	0.71	TFD Met + Cys	9.5
Vit + Min	-	7.1	TFD Thr	8.3
Total	320	1000	TFD Arg	14.1
			TFD Ile	8.5
			Calcium	10.0
			Dig. P	5.1
			Sodium	1.5
			Chloride	2.3

} **270**

Real value of Fishmeal



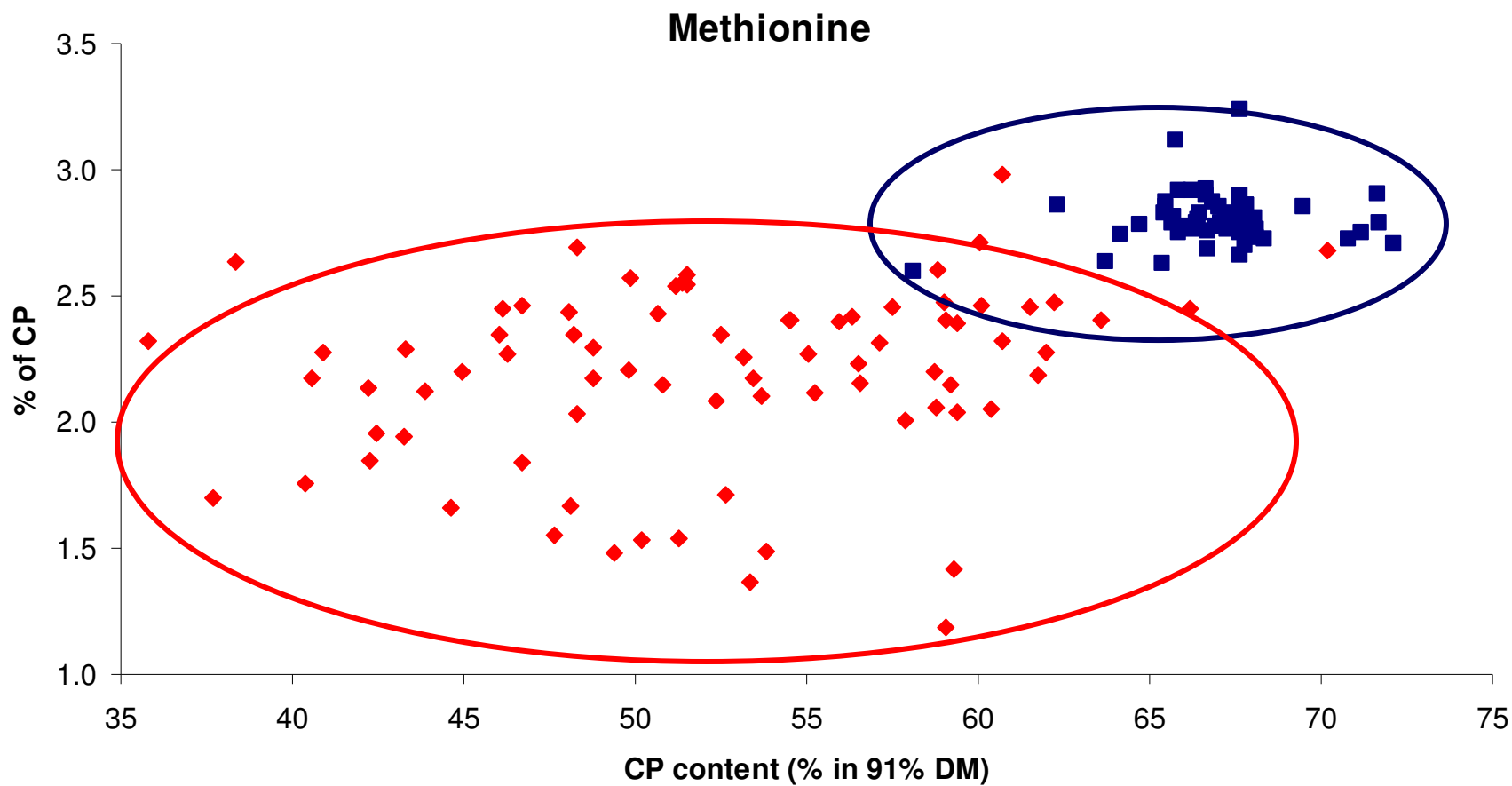
Shadow price: South American (CP 65.9) 711 US\$/MT
Indian (CP 48.5)..... 441 US\$/MT

Ratio: CP (48.5/65.9) 74 %
Shadow price (441/711) 62 %

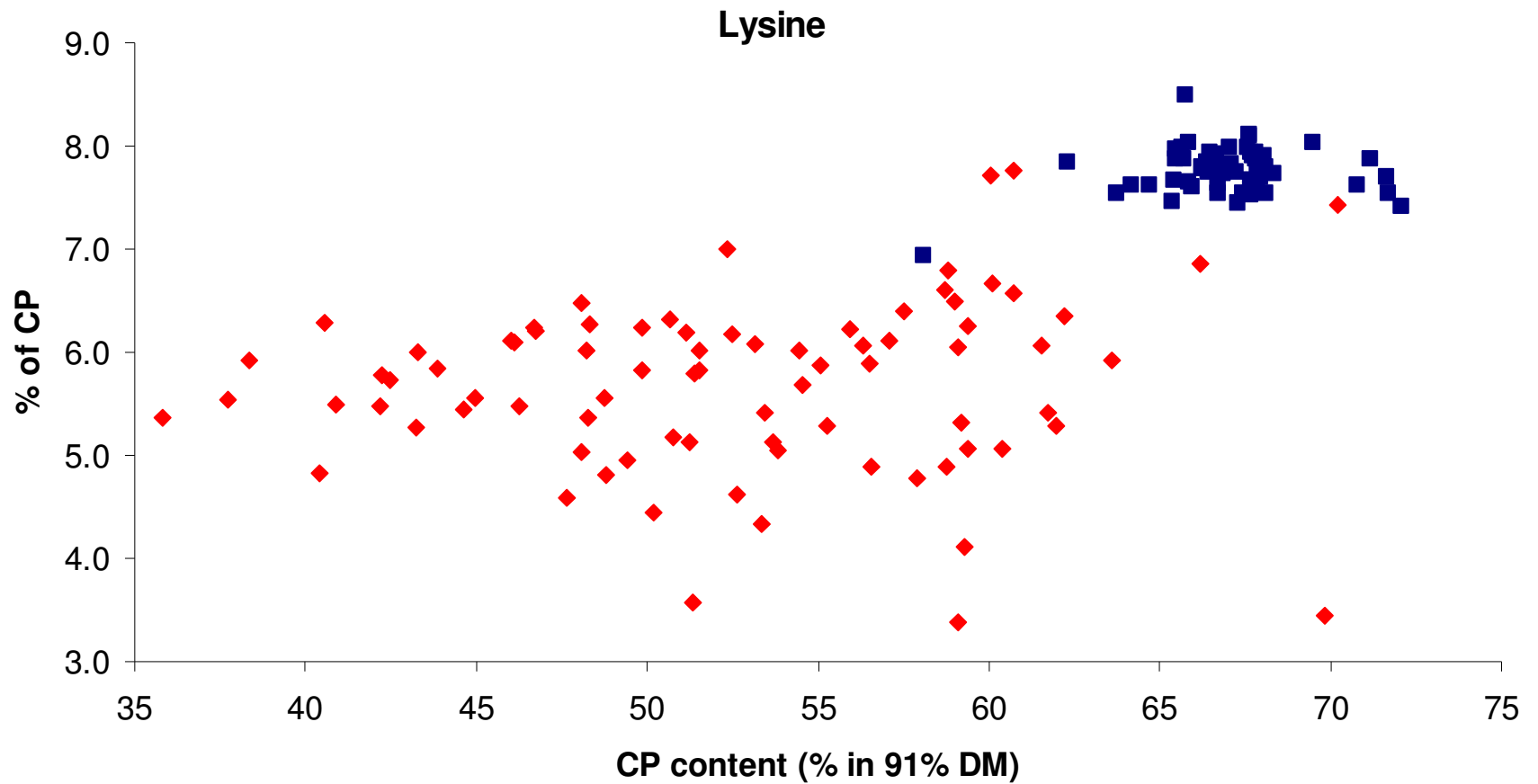
- If price is based on CP content the you will be much better of when buying South American fishmeal.
- Thus, purchase decisions should be based on real value, i.e. nutrient content (amino acids)

Prediction of amino acid content in fishmeal

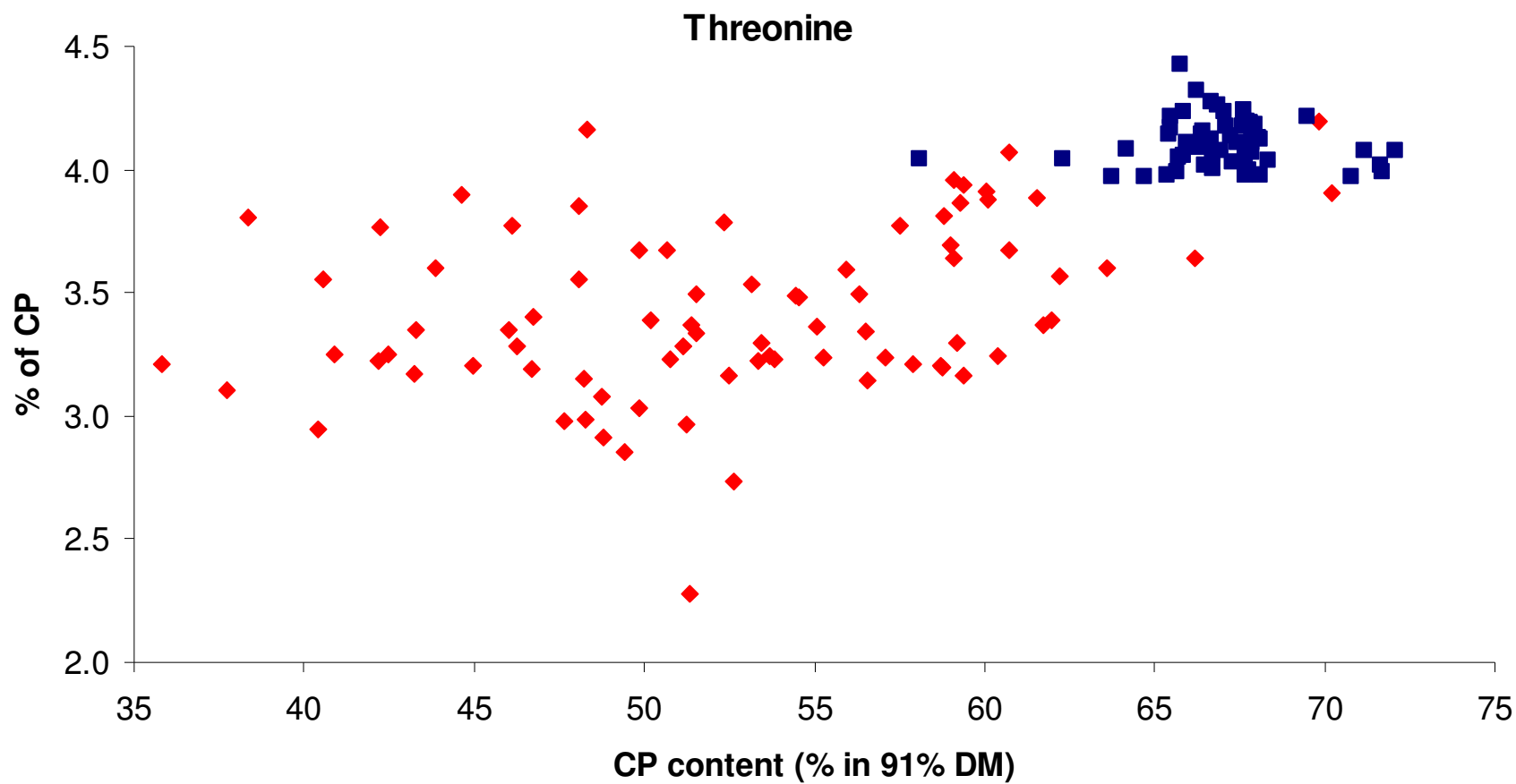
Methionine



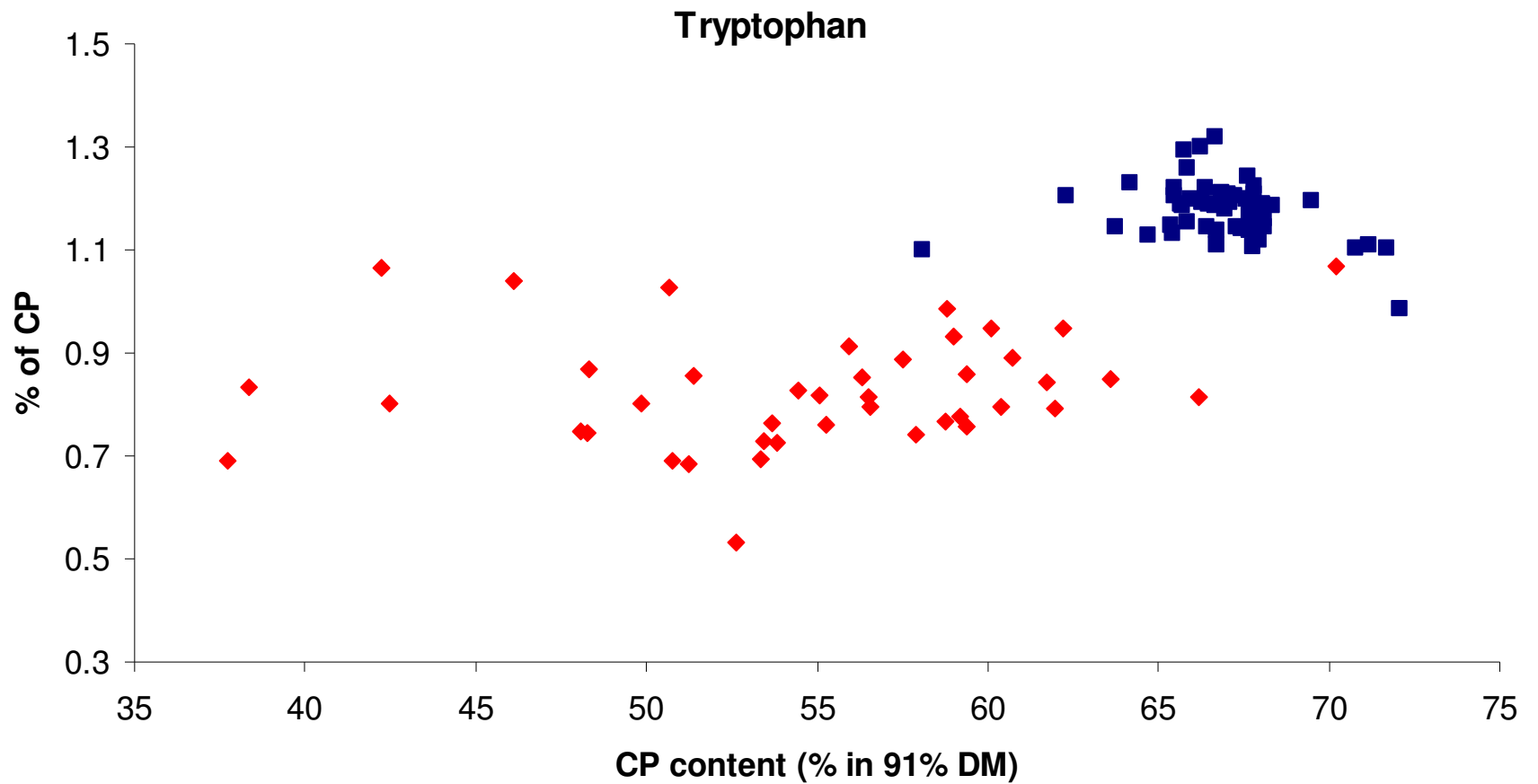
Lysine



Threonine



Tryptophan



- High variation in the amino acid profile (% of CP) especially in Indian fishmeal makes it difficult to predict content based on book values or regression equations

How to monitor and evaluate nutrient content and variation in Raw Materials ?

Raw material evaluation is only as good as the weakest link of the process chain



Sampling and Analysis

Statistical evaluation

Taking action

Do

Systematically, over defined period, e.g. via NIRS

Evaluate aggregated data per country or supplier and compare nutrient content means and variation

**C
O
M
M
U
N
I
C
A
T
I
O
N**

Communicate results to those who can take action:

- Purchasing
- Quality control
- Nutrition/formulation
- Feed mill

Don't

Spot sampling

Look at analytical results of individual samples in isolation

Keep analytical results in the QC lab



Sampling and Analysis

Do

Systematically, over
defined period, e.g.
via NIRS

Don't

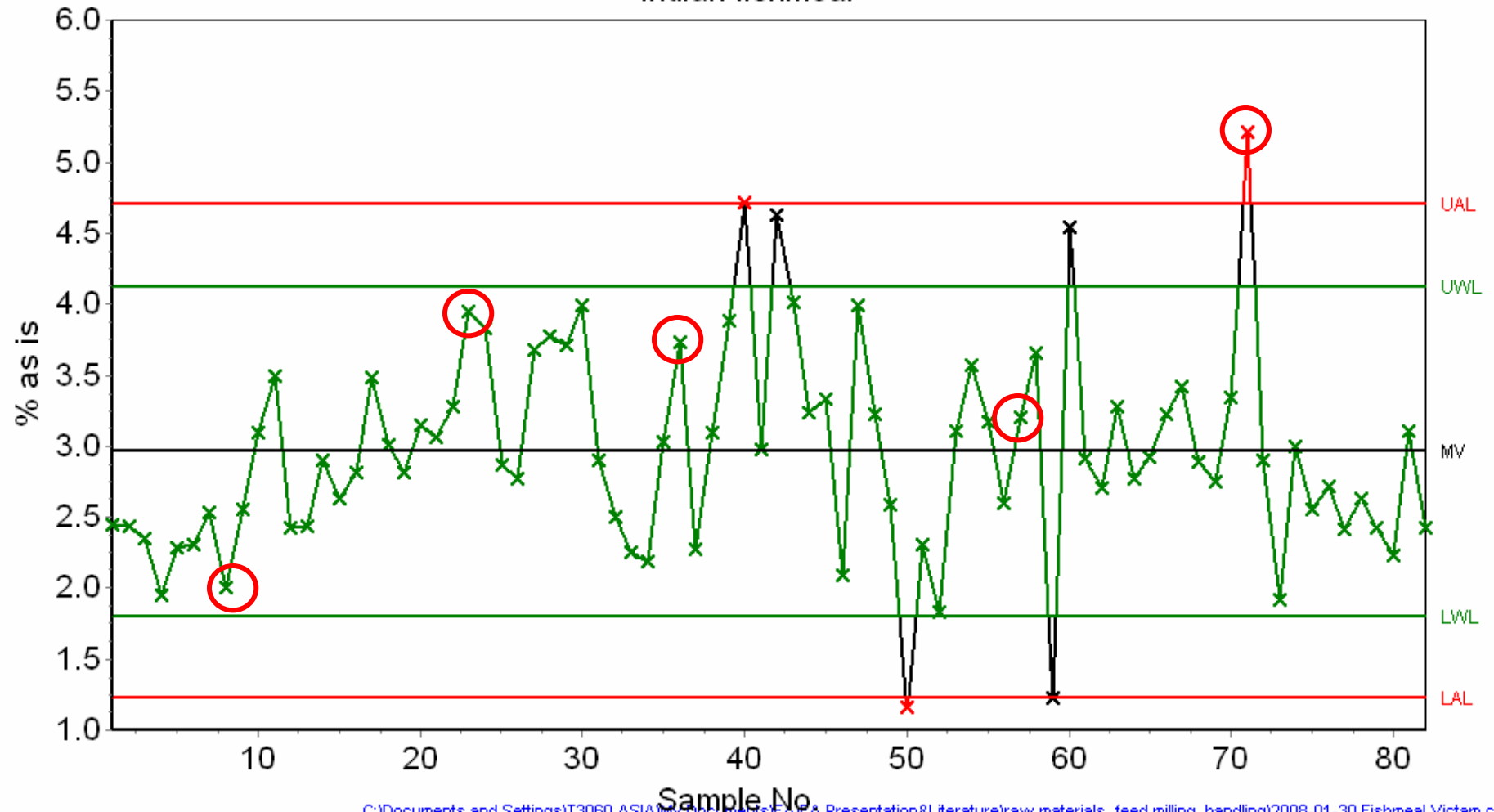
Spot sampling

Only frequent and continuous sampling allows to detect nutrient variation



Lysine content

Indian fishmeal





Do

Systematically, over defined period, e.g. via NIRS

Evaluate aggregated data per country or supplier and compare nutrient content means and variation

Don't

Spot sampling

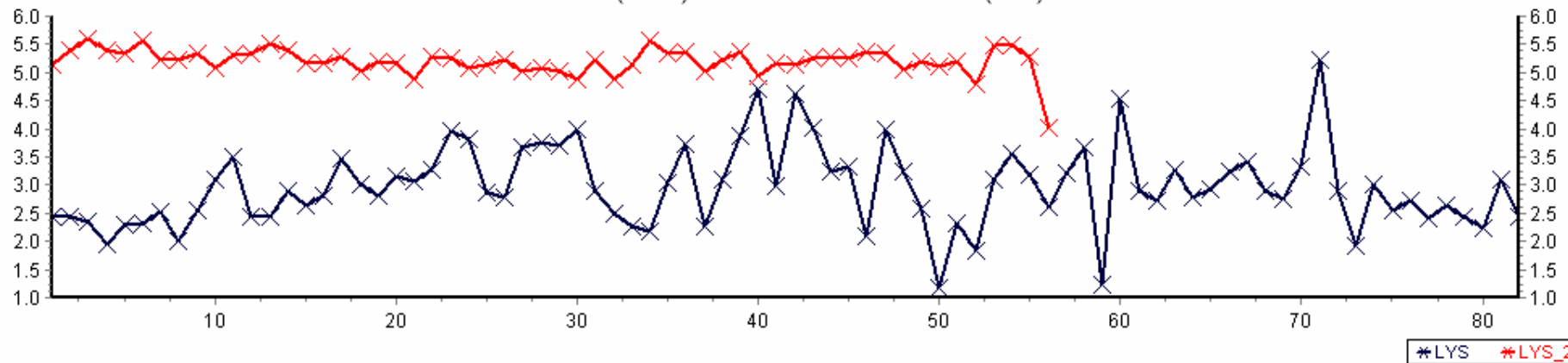
Look at analytical results of individual samples in isolation

AminoQ™ reveals substantial differences in Lys content & variation between sources



Meanvalue chart for lysine content in Fishmeal

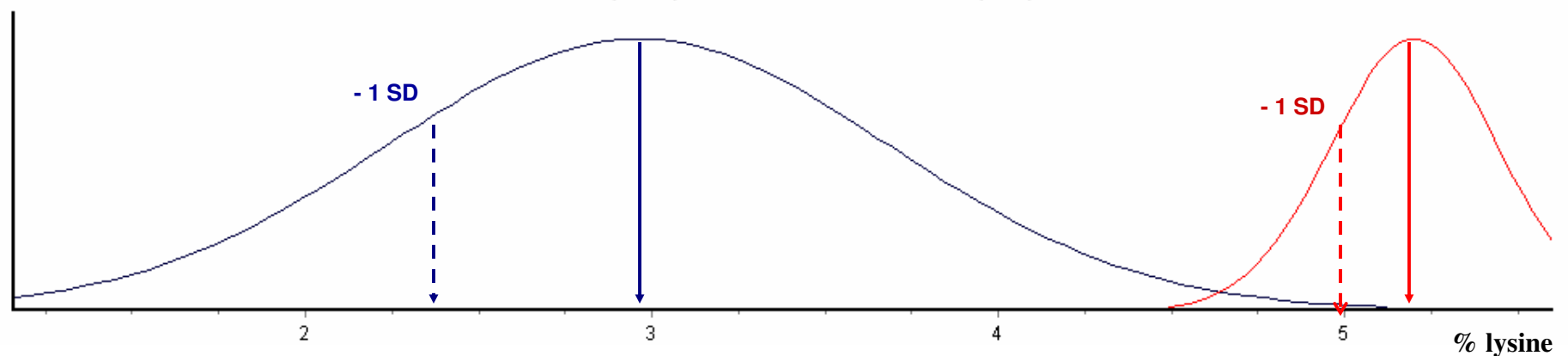
Indian (blue) and South American (red)



C:\Documents and Settings\T3060.ASIA\My Documents\FA\FA Presentation&Literature\raw materials, feed milling, handling\2008-01-30 Fishmeal Victam.csp

Sample distribution

Indian (blue) and South American (red)



* 1 Std Dev. = 83% probability that batch contains at least the stated nutrient content

Managing raw material variability



On-line check of incoming raw materials

- Reject poor quality and/or extremely variable batches
- Allocate batches to “High” or “Low” quality
- Evaluate & rank different sources more accurately

Differentiation between suppliers or origins for storage

- Split variable ingredients into more consistent sub-groups

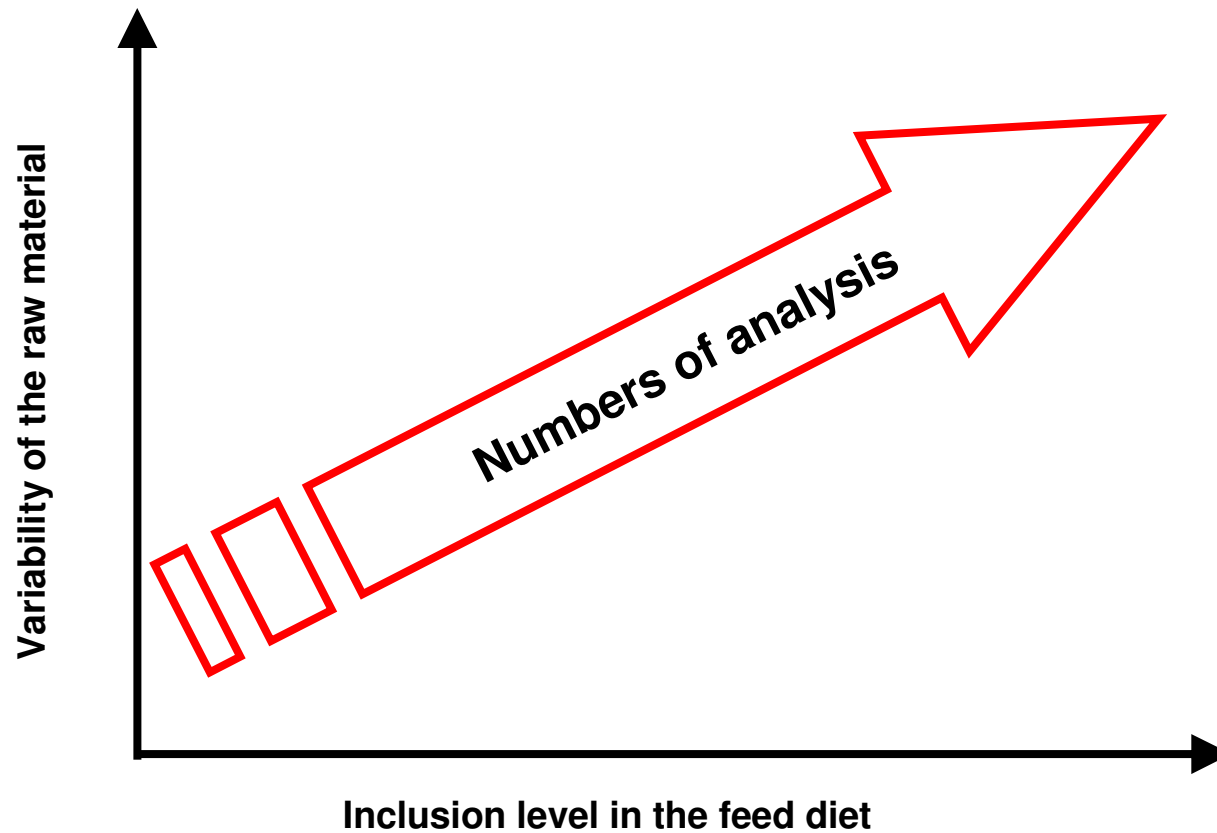
Information transfer to Least Cost Formulation

- Continuous updates of ingredient matrix vs. table values

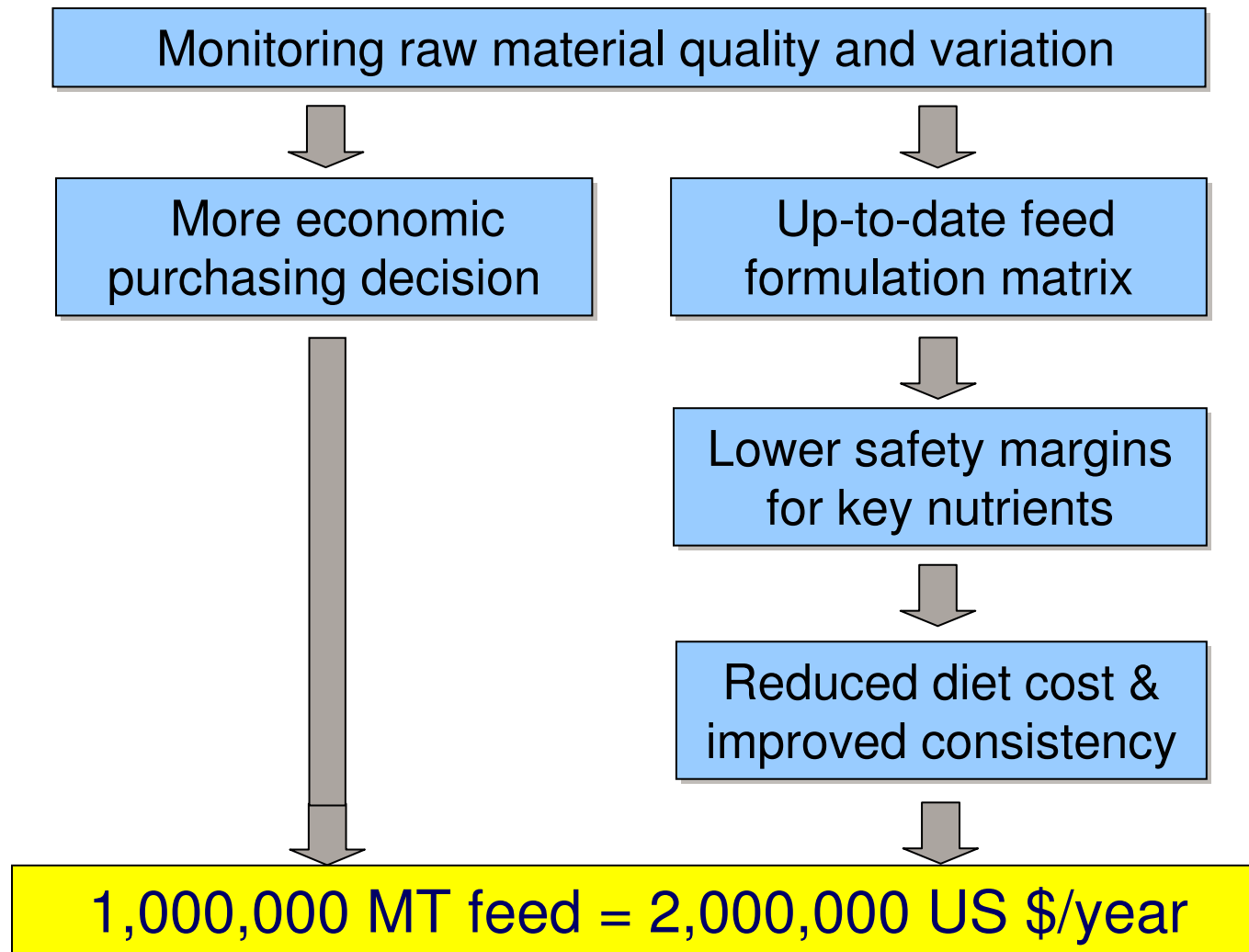
We all have limited resources

**So where do we get the highest
payback?**

Nutrient variation in feed – Where should we focus ?



Monitoring raw material quality is key to optimum profitability



Conclusions



- Economic value depend on amino acid content rather than CP content
- Difference in real value of South American and Indian fishmeal is affected by safety margin (variation)
- Huge variation in amino acid content in especially Indian fishmeal.
- No consistent amino acid profile (% of CP), i.e. amino acid content is difficult to predict by regressions or table values.
- Management can reduce variability (sub-samples) and lead to low safety margins and thereby higher profitability

Thank you for your attention!

