



Department of  
Agriculture and Food



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# The Competitive Position of Australian Grains in SE Asian markets - 5 years after deregulation

Dr. Soon-Bin Neoh

Soon Soon Group of Companies  
Malaysia  
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# Content

1. Competitive trade position of Australian wheat in SE Asia post deregulation
2. Comparison of Australian wheat with wheat from other origins in Asian food products
3. Performance of new varieties of Australian Prime Hard (EGA Kidman & Gascoigne) developed for sponge and dough bread making
4. Potential use of Australian soybeans in Asian food products
5. Potential for Australian canola in SE Asia
6. Opportunities for the use of lupins in Asian foods and animal feeds
7. Take home messages



# Distance From Perth to Brisbane (B), Jakarta (C), Singapore (D) and Brisbane (B) to Singapore (D)



# South East Asia Countries

## Wheat Consumption (Year 2012/13)

<b>Southeast Asia</b>	<b>Population (Million)</b>	<b>Wheat Import (MT)</b>	<b>Per Capita Wheat Consumption (KG)</b>
Indonesia	245.90	6,900,000.00	28.1
Malaysia	29.76	1,470,000.00	49.4
Philippines	97.70	3,600,000.00	36.8
Singapore	5.39	350,000.00	64.9
Thailand	69.52	1,900,000.00	27.3
Vietnam	90.39	2,400,000.00	26.6
<b>Total for SE Asia</b>	<b>538.66</b>	<b>16,620,000.00</b>	<b>30.9</b>
<b>Australia</b>	<b>23.39</b>	<b>6,335,000.00</b>	<b>270.9</b>

Source : Australian Commodities Independents/USDA



# **Advantages for wheat buyers post deregulation**

- More sellers in market
- Price more competitive due to increased competition
- Free market principle
  - no special allocation to any buyer
  - no discrimination of buyer with smaller volumes
  - highest bidder get the goods
- Better contacts with farmers possible to do contract farming for special needs

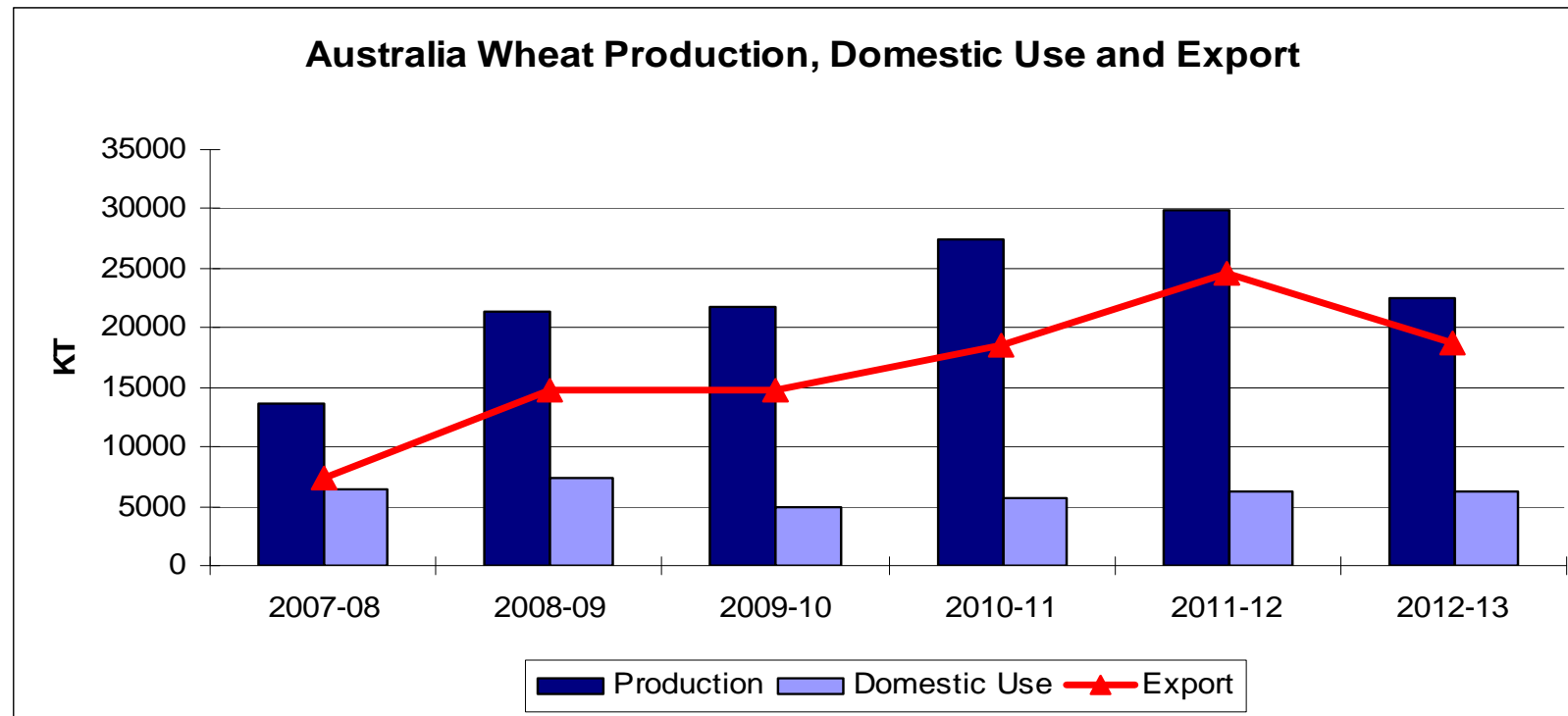


# Disadvantages

- Sometime price not align with international markets due to local supply demand conditions
- Large quality fluctuations for containerised shipments
- Less reliable supply
- Wheat may not be available for export through the end of crop year
- No unified information on crop quality
- No technical support



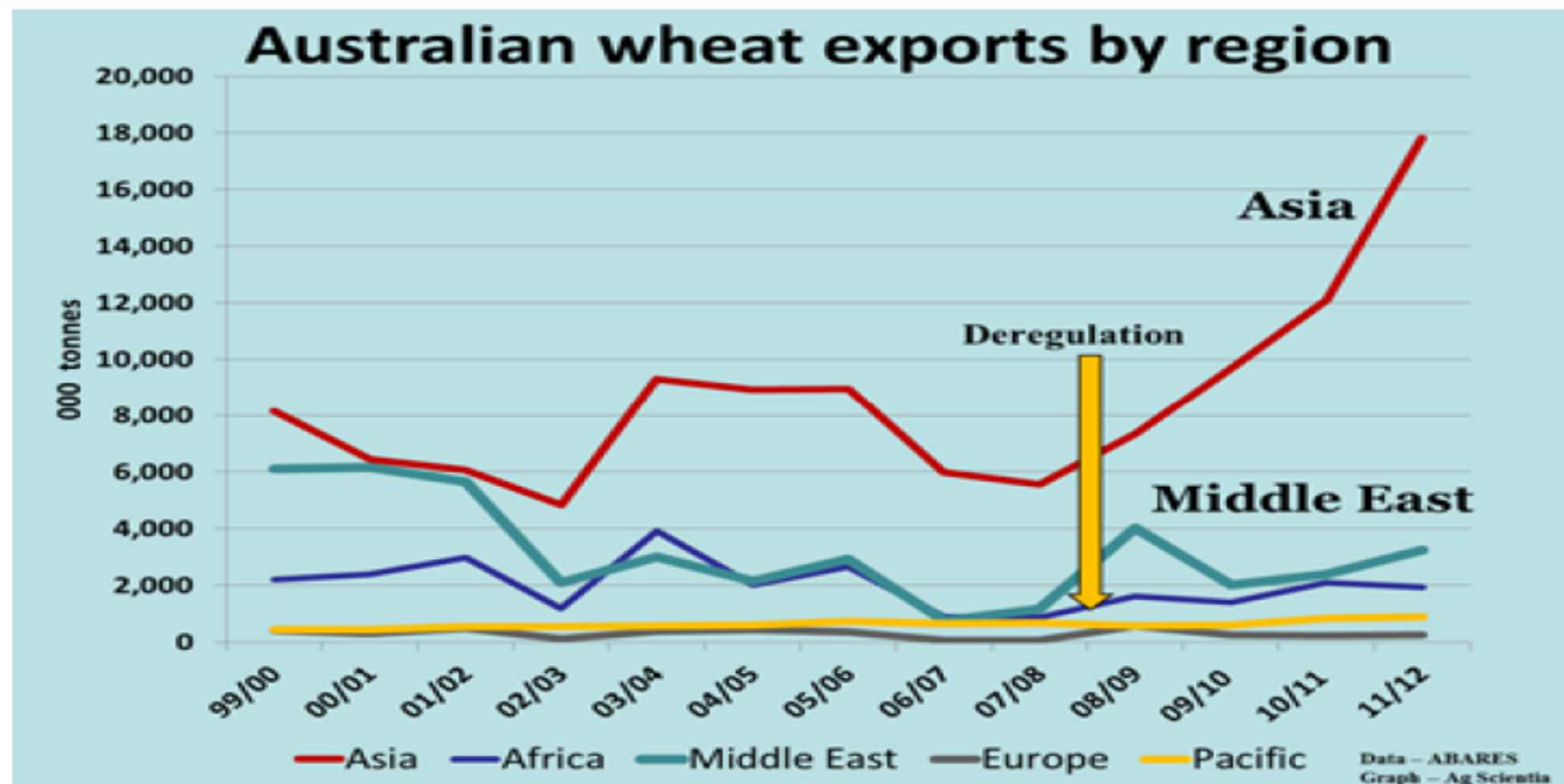
# Post Deregulation shows increase of Export for Australia Wheat



Source: ABARES, 2014

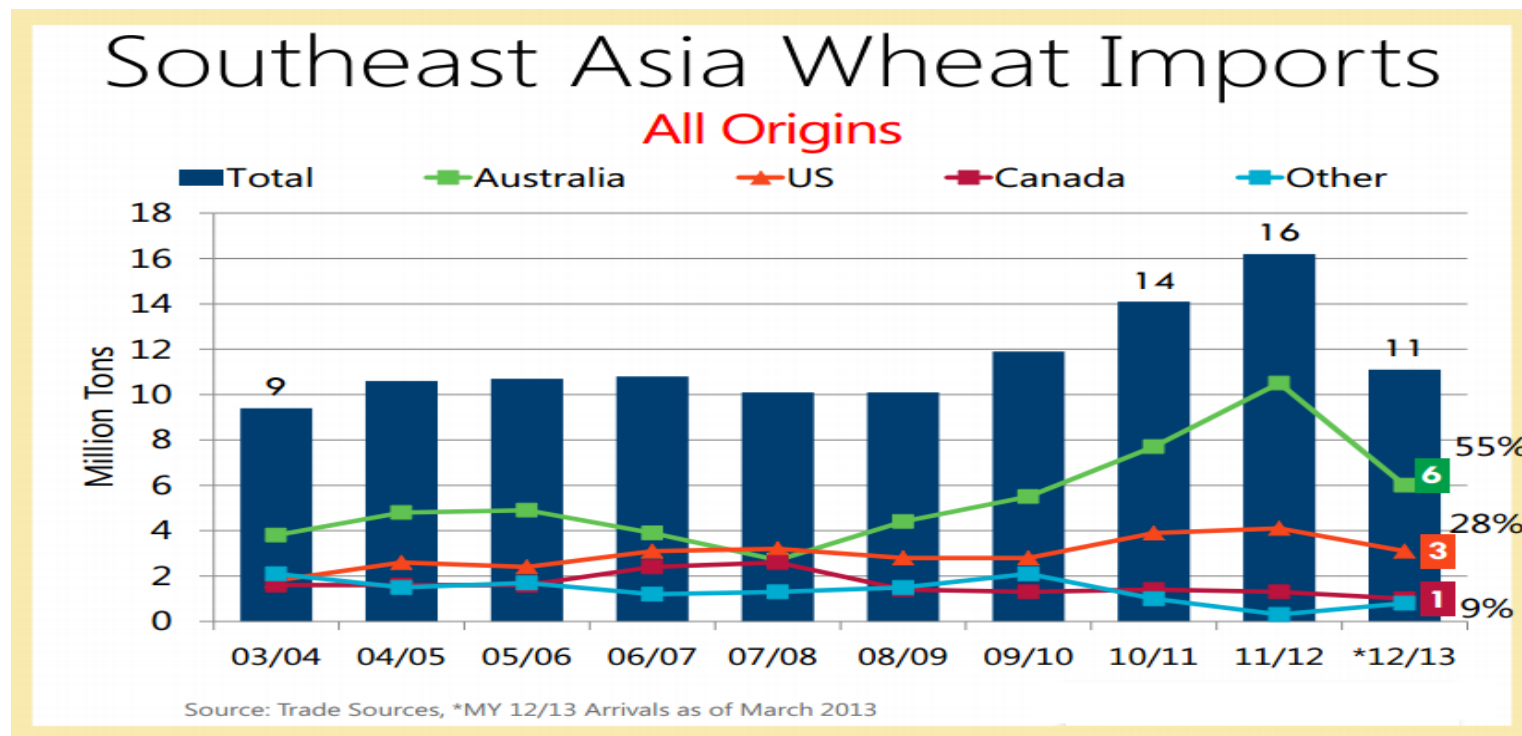


# Post Deregulation shows increase of Wheat Imported from Australia to Asia



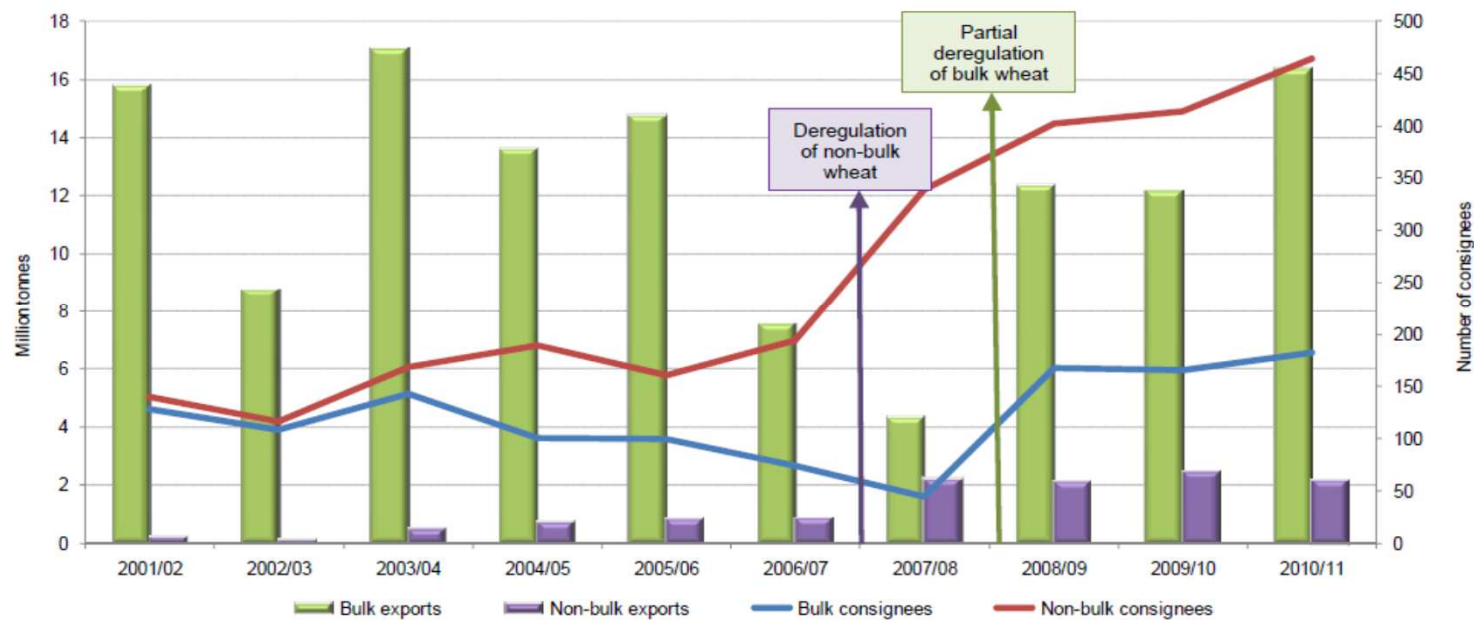


# Post Deregulation shows increase of Wheat Imported from Australia to SE Asia compared with other origins



# Post Deregulation shows increase of non-bulk exports and number of consignees

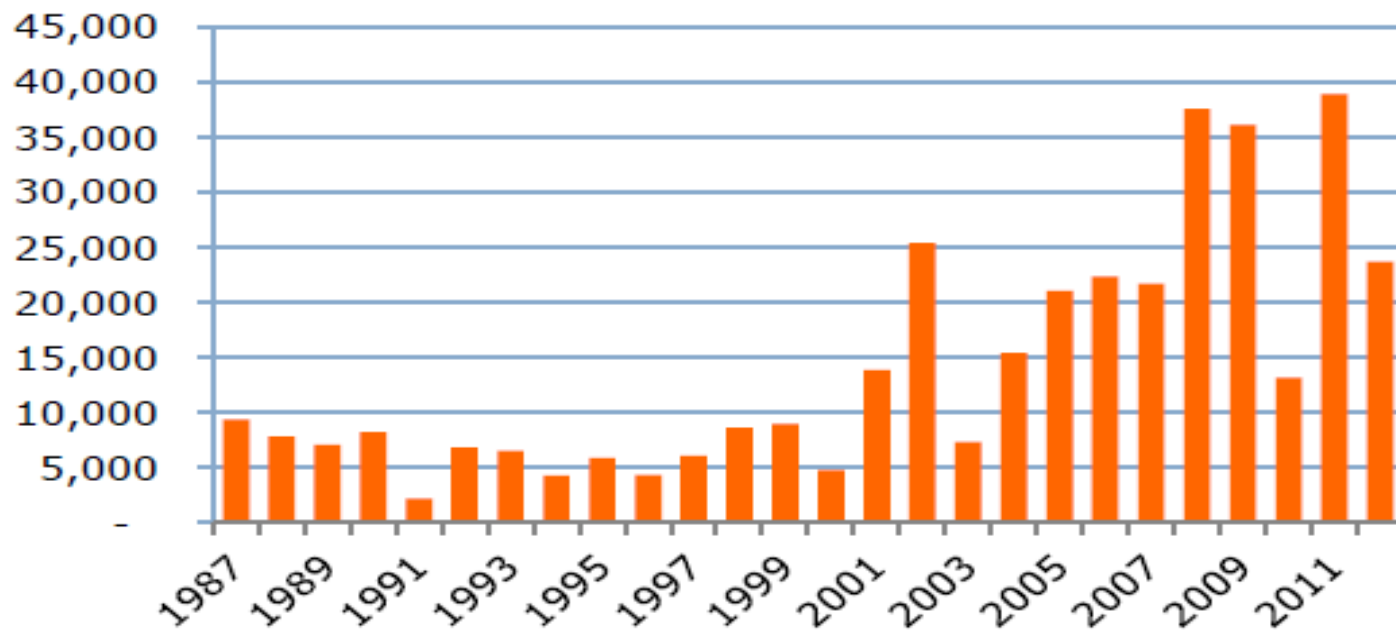
Consignees and tonnages exported by year for bulk and non bulk exports



# Black Sea Wheat Export Increase

Figure 4: Black Sea wheat exports, 1987-2011

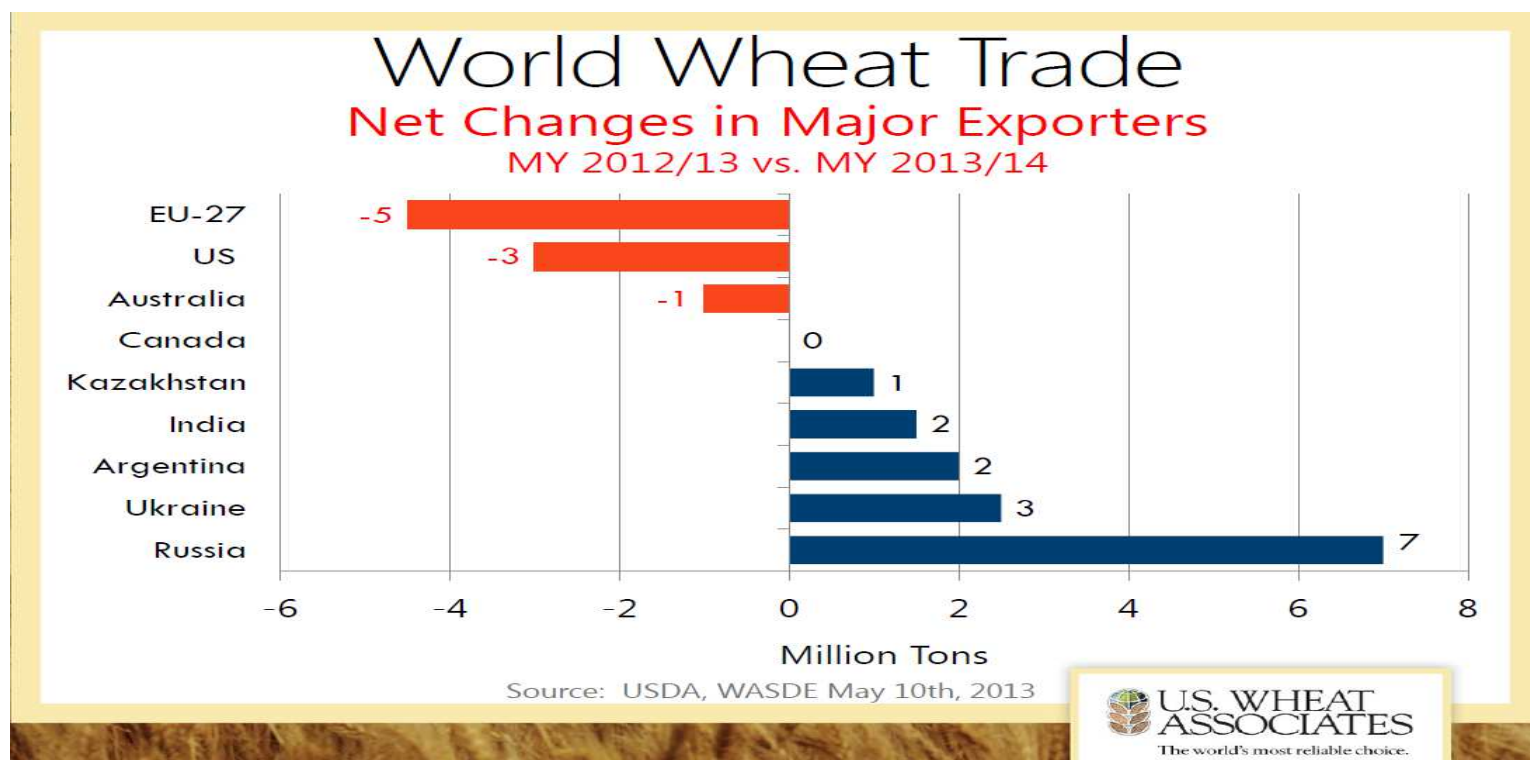
thousand tonnes



Source: USDA, Rabobank, 2012

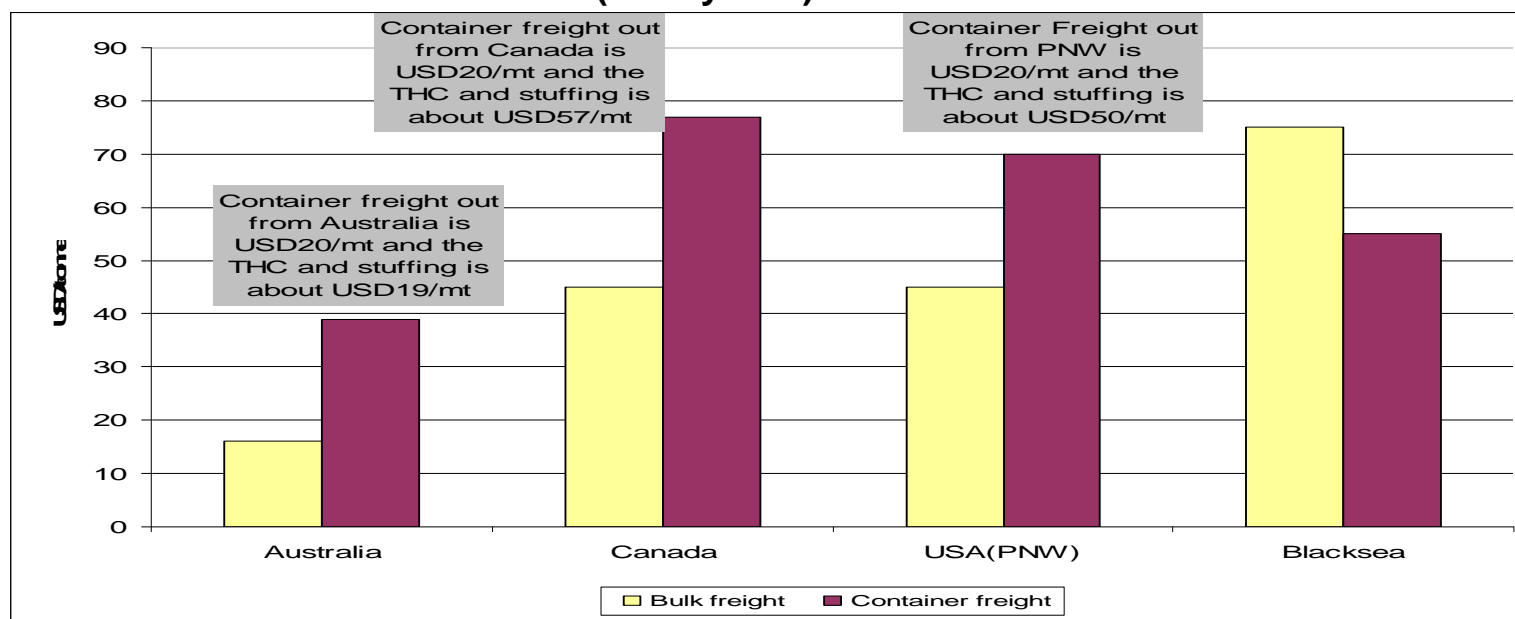


# Export from Black Sea further increased this year



# Freight spreads favor Australia Wheat but container freight for Black Sea is lower than bulk freight

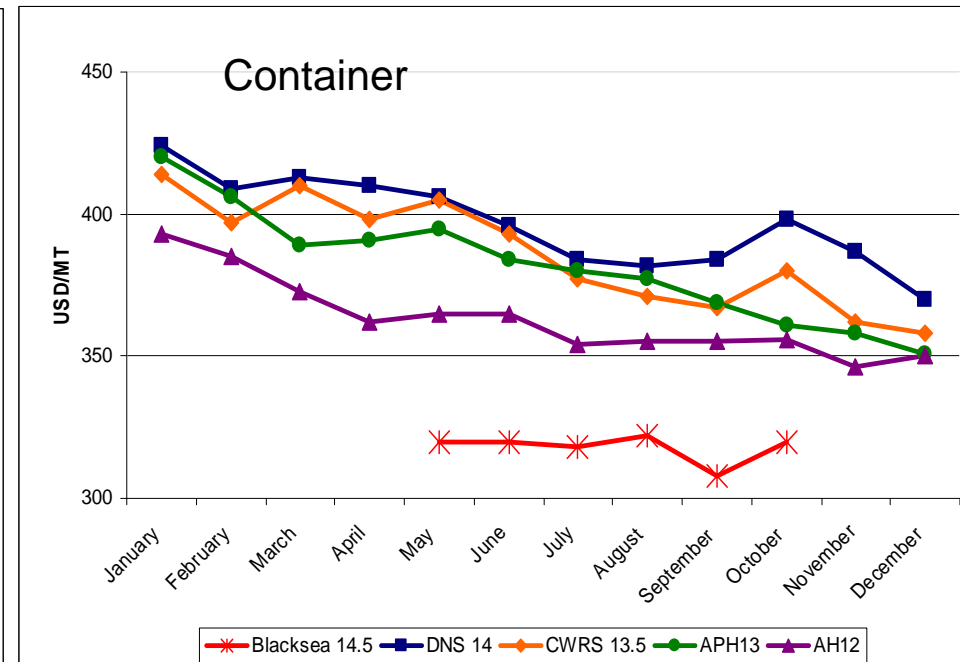
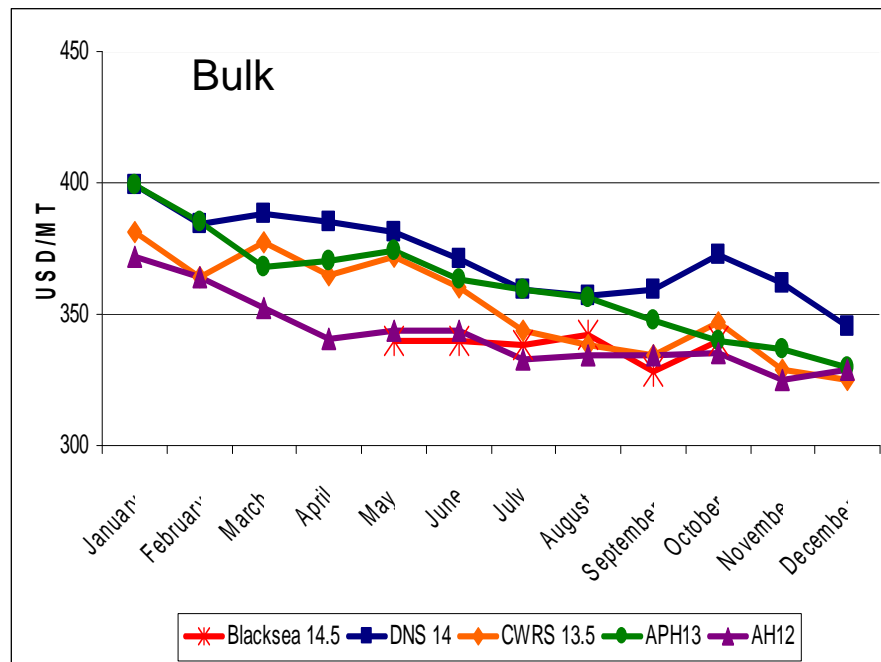
Freight rates from Australia/Canada/USA/Blacksea to South East Asia –  
Bulk (Handy size) vs Container



Source: Trade Sources, 2013

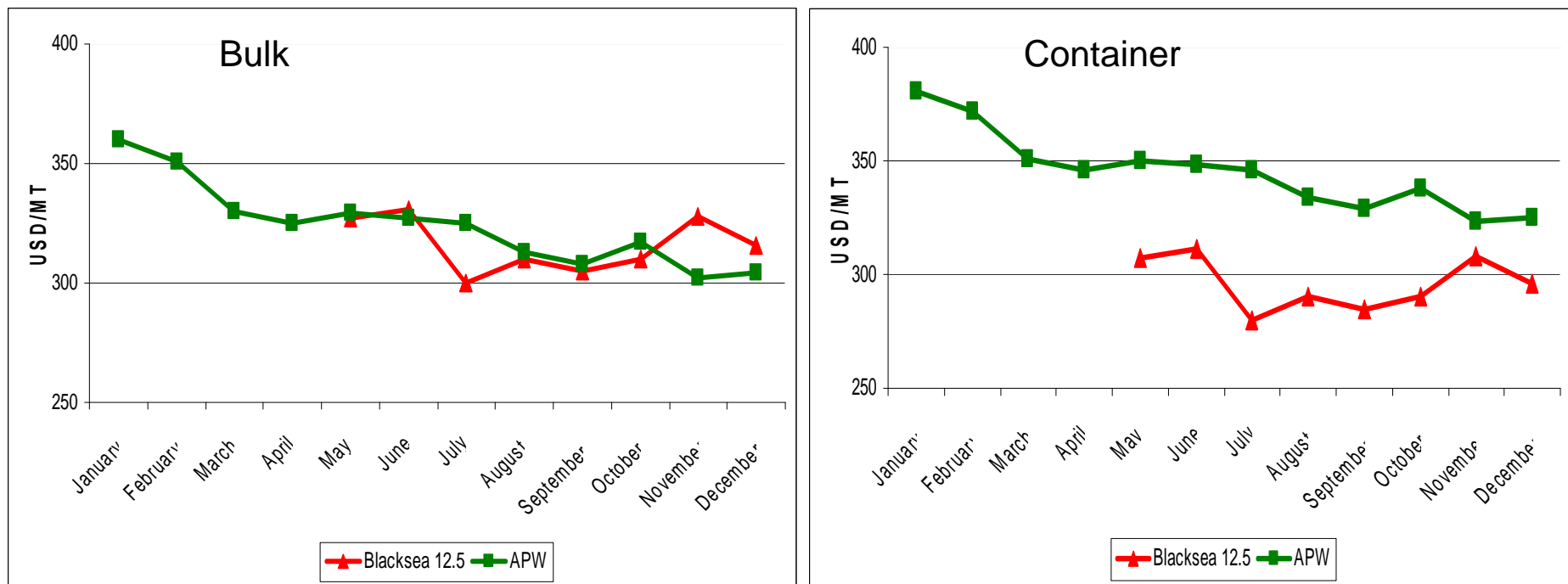


# Comparison of High Protein Wheat Prices in Bulk Vs Container (CNF Malaysia) for Year 2013



Source: Trade Sources, 2013

# Comparison of Medium Protein Wheat Prices in Bulk Vs Container (CNF Malaysia) for Year 2013



Source: Trade Sources, 2013

# Problems Encounter by Buyers Since Deregulation

- Containerised shipments have large quality variation.
- Excessive foreign materials
- High contaminations of foreign seeds





# Problems Encounter by Buyers Since Deregulation

- Classification of wheat type especially for containerised shipments is uncertain e.g. who will certify what is APH or AH
- Occasionally shortage of containers and container loading facilities



# **Comparison of Australian wheats with wheats from other origins in Asian food products**



# Asian Food Products and its Market Share in Malaysia

	Total (mt/month)	Market Share (%)
<b>Bread</b>	12,650	20.0
<b>Instant noodle</b>	9,000	14.0
<b>Wet / Wonton/Dry noodles</b>	8,000	12.0
<b>General Purpose flour(25kg)</b>	15,000	23.0
<b>General Purpose flour(1kg)</b>	7,000	11.0
<b>Biscuits</b>	6,550	10.0
<b>Steamed bread/Cakes/Pastry</b>	3,500	6.0
<b>Industrial Flour</b>	3,100	4.0
<b>Grand Total</b>	64,800	100



# Asian Food Products Using Wheat Flour

- \* Noodles  
(alkaline noodle, Instant noodle, wanton noodle)
- \* White Bread and buns
- \* Cracker biscuit
- \* Marie biscuit
- \* Steamed bread



# Overall flour quality requirements for **Noodles**

- \* Bright yellow noodle
- \* Good quality gluten with high viscosity for firm and elastic noodles
- \* Fast gluten development and good extensibility for easy processing
- \* Good color stability (Wantan noodle/ fresh noodle)
- \* High falling number with low enzyme activity for non sticky noodle and longer shelf life



Instant noodle



Alkaline wet noodle



Wantan noodle



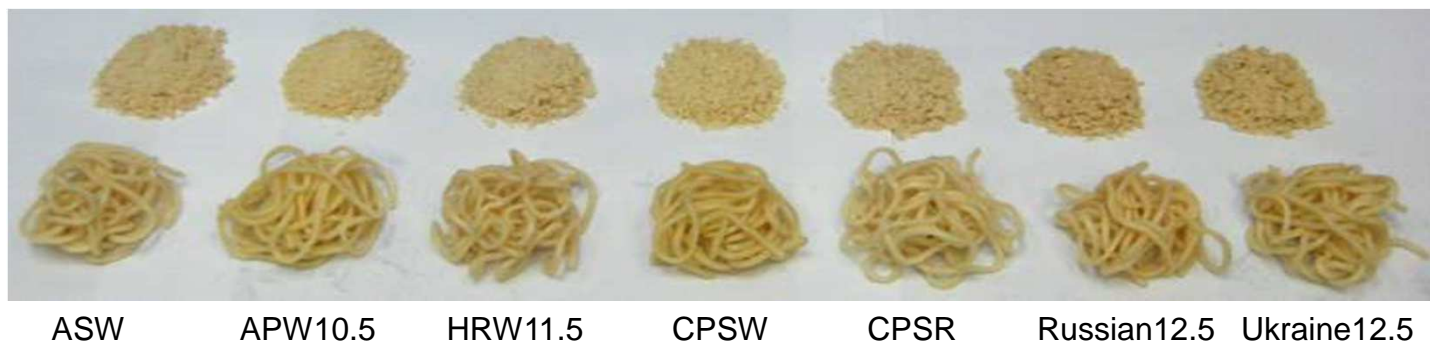
vermecelli



Dried noodle



# Performance of various types of Medium Protein Wheats in Alkaline Wet Noodle



## Summary of wheat performances in Alkaline wet Noodle:

Water absorption : APW=HRW=CPSW>ASW=CPSR>Russian=Ukraine

Brightness of Color : APW=CPSW> ASW>Russian > CPSR>HRW>Ukraine

Texture/Strength : APW=HRW=CPSW>Russian=Ukraine>ASW

**Overall performance rating : APW =CPSW>HRW>CPSR=ASW>Ukraine12.5=Russian wheat 12.5**



# Overall performance of Wheat Types in *Noodles*

Wheat Types	Origins	Quality rating	
		Good	Acceptable
APH/AH	Australia	V	
APW	Australia	V	
ASW	Australia		V
Indian wheat	India		V
Pakistan wheat	Pakistan		V
Russian wheat	Russia		V
Ukraine wheat	Ukraine		V
HRW	US		V
CWHWS/CPSW	Canada	V	



# Overall flour quality requirements for *Bread*

- \* High water absorption for better processing and higher yield
- \* Good gluten quality for better sponge tolerance and oven spring
- \* Short mixing time with good mixing tolerance
- \* Good gas retention to give good volume
- \* Soft eating quality for longer shelf life



White bread



Burger buns



Sweet bun

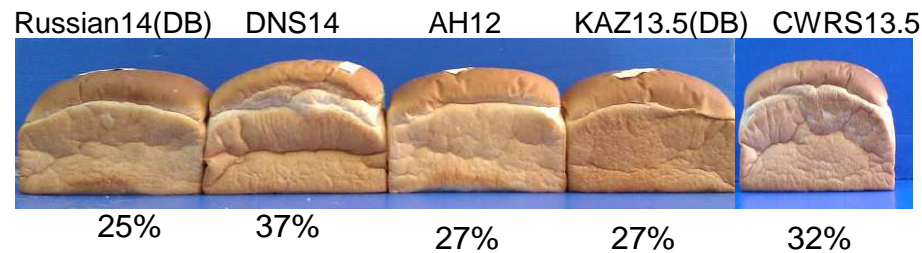


Filling buns

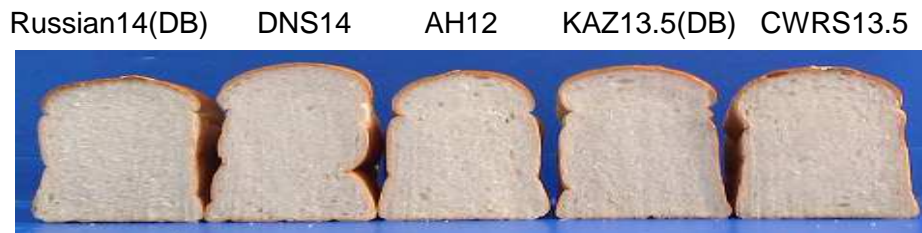


# Performance of various types of High Protein Wheats in *Bread*

A : % of Oven spring



B : Crumbs structure



## Summary of wheat performances on bread:

- Water absorption : CWRS > DNS > KAZ > AH12 > Russian wheat
- Oven spring : DNS > CWRS > AH12 = KAZ > Russian wheat
- Crumbs structure : DNS > CWRS = KAZ > AH12 > Russian wheat

**Overall performance rating : DNS > CWRS > AH = KAZ > Russian**



# Overall Performance of Wheat Types in *Bread*

Wheat Types	Origins	Quality rating	
		Good	Acceptable
APH13	Australia	V	V
AH12-13	Australia		V
CWRS13.5-14.5	Canada	V	
CWHWS13-14	Canada		V
DNS14-15	US	V	
HRW13	US		V
High protein Blacksea wheat 14.5-15( db)	Kazakhstan		V
	Lithuanian		V
	Russian		V
	Ukraine		V



# Overall flour quality requirements for *Biscuits*

- \* Extensible dough characteristic for better sheeting process
- \* Strong gluten quality for good fermentation tolerance (cracker production)
- \* Fast hydration rate - short mixing time
- \* Produce light , flaky and crispy biscuit



cracker



Sandwich biscuits  
with filling

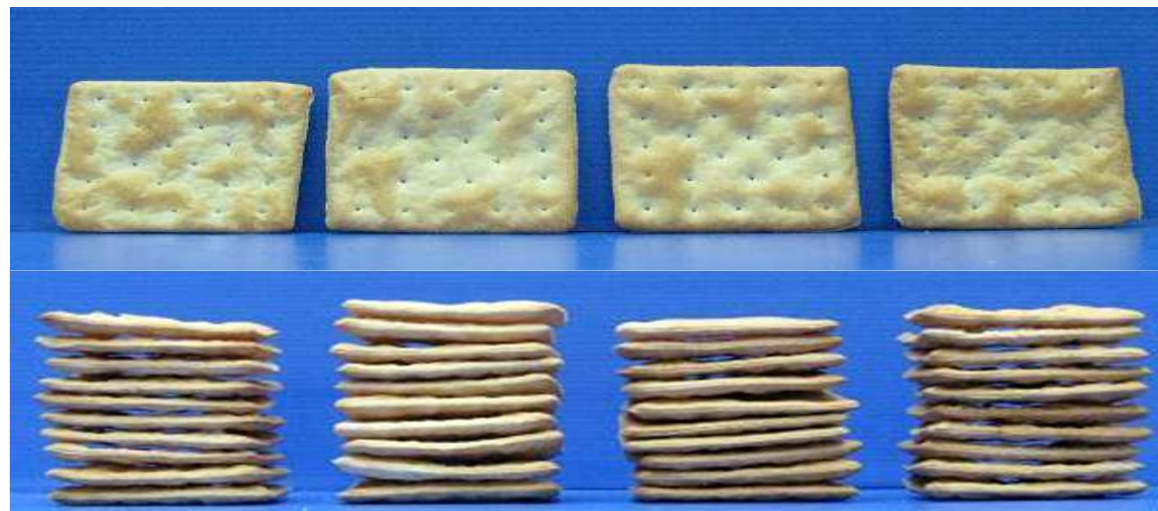


Marie



wafers

## Performance of various types of High Protein Wheats in *Cracker*



APH 13

CWRS13.5

CWHWS13

DNS14

### Summary of wheat performances on Cracker:

- CWRS13.5 and DNS14 showed better puffiness than APH13 and CWHWS
- CWHWS and CWRS13.5 provide better eating quality, the biscuit is more flaky and crispy.

**Overall performance rating : CWRS13.5 > CWHWS 13> DNS >APH13**

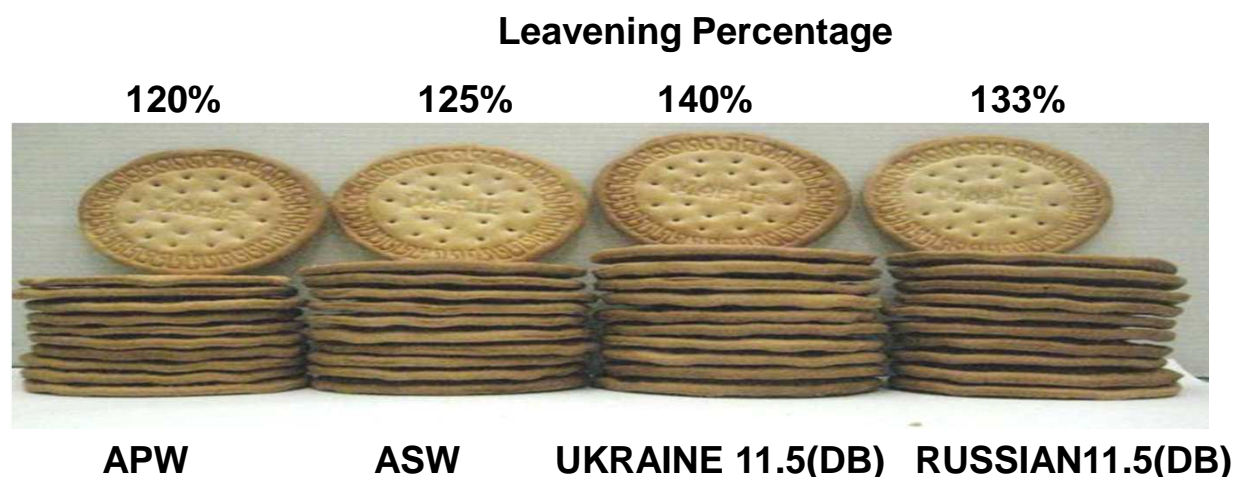


# Overall Performance of Wheat Types in *Cracker*

Wheat Types	Origins	Quality rating	
		Good	Acceptable
APH13	Australia		V
AH12-13	Australia		V
CWRS13.5-14.5	Canada	V	
DNS14-15	US	V	
High protein Blacksea wheat 14.5-15( db)	Kazakhstan		V
	Lithuanian		V
	Russian		V
	Ukraine		V



# Performance of various types of Medium Protein Wheats in *Marie biscuit*



## Summary of wheat performances in Marie biscuit :

- Ukraine and Russian wheat can give better puffiness with a crispy and looser texture when compared with ASW and APW wheat

**Overall performance rating : Ukraine > Russian > ASW > APW**



# Overall Performance of Wheat Types in *Marie biscuit*

Wheat Types	Origins	Quality rating	
		Good	Acceptable
APW	Australia		V
CPSR	Canada		V
ASW	Australia	V	
Indian wheat	India		V
Russian wheat	Russian	V	
Ukraine wheat	Ukraine	V	



# Overall flour quality requirements for *Steamed Bread*

- \* Bright and white coloured product
- \* Good symmetry form/shape
- \* Good water absorption for easy processing
- \* Soft and springy eating quality



Plain steamed bread

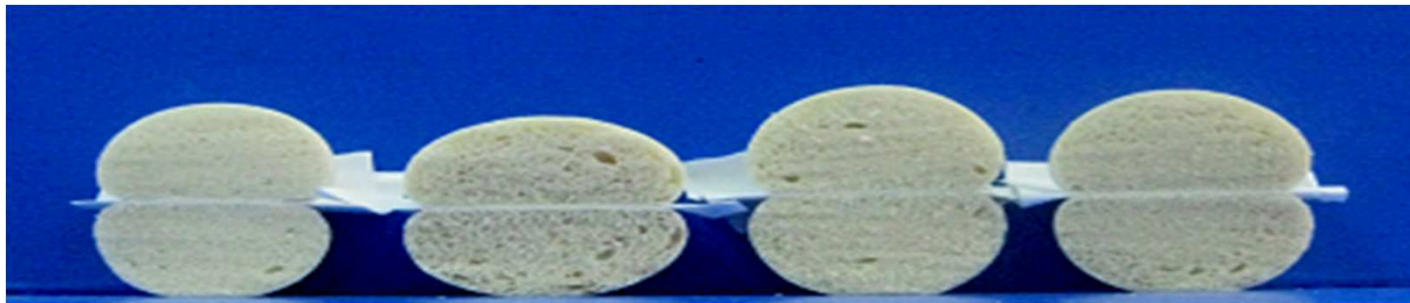


Steamed bread with filling





## Performance of various types of Medium Protein Wheats in *Steamed Bread*



APW

Indian wheat

Ukraine12.5(DB)

Russian12.5(DB)

### Summary of wheat performances on steamed bread:

- APW showed brighter / whiter color and good shape
- Russian and Ukraine wheat give good volume , but the color is not as good as APW
- Indian wheat quality is not suitable to use in steamed bread

**Performance rating : APW > Russian = Ukraine > Indian wheat**



# Overall Performance of Wheat Types in *Steamed Bread*

Wheat Types	Origins	Quality rating	
		Good	Acceptable
APW	Australia	V	
ASW	Canada		V
Indian wheat	India		
Russian wheat	Russian		V
Ukraine wheat	Ukraine		V



**New Prime Hard varieties  
(EGA Kidman & Gascoigne)  
developed for Sponge and  
Dough bread making VS DNS  
14 and CWRS13.5**



# Comparisons using open top white Bread

	Comparison 1	Comparison 2	Comparison 3	Comparison 4
Method	Sponge & Dough	Sponge & Dough	Sponge & Dough	No time Dough
Sample	1. 100% DNS14  2. 100% CWRS13.5  3. APH (Kidman & Gascoigne blend)	1. 50%DNS +50%CWRS  2. 50%DNS+50% APH (Kidman + Gascoigne blend)  3. 50%CWRS+ 50% APH (Kidman + Gascoigne blend)	1. 100% CWRS  2. 100%DNS  3. 100% APH (Kidman)  4. 100%APH13 (Loading port: Brisbane)  5. 100% APH13 (Loading port: Sydney)	1. 100% CWRS  2. 100%DNS  3. 100% APH (Kidman)  4. 100%APH13 (Loading port: Brisbane)  5. 100%APH13 (Loading port: Sydney)



## Comparison 1: APH13 (Kidman & Gascoigne blend), DNS14 and CWRS13.5

Open top white bread produced from sponge and dough method

A) Sponge characteristic after fermented 4 hours



100% DNS14

Smooth surface

Indicates:  
Strong gluten



100% CWRS13.5

Smooth surface

Strong gluten



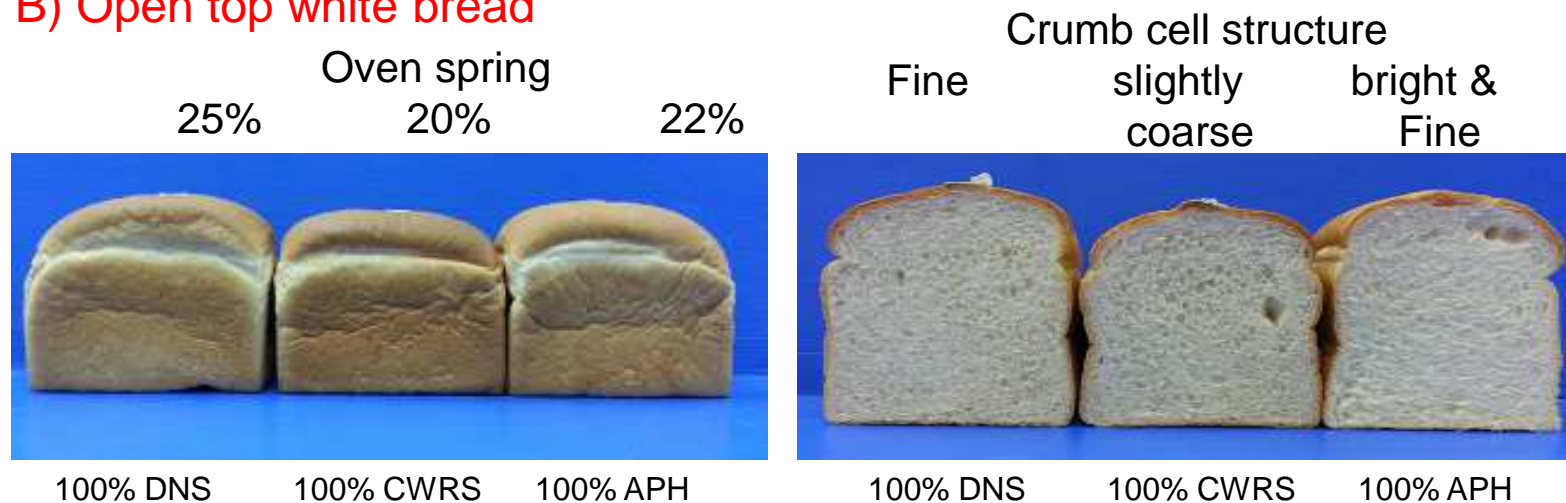
100% APH13

Rough surface with gas bubbles

weaker gluten

## Comparison 1 : APH13 (Kidman & Gascoigne blend), DNS14 and CWRS13.5

### B) Open top white bread



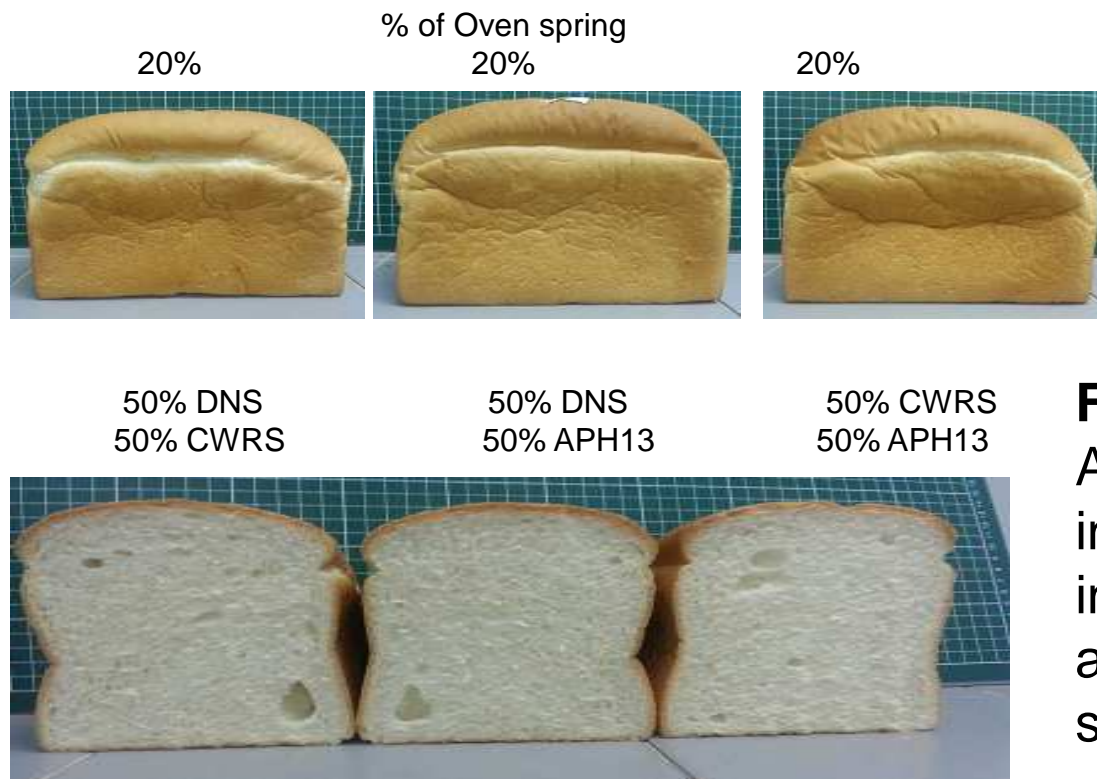
### Finding :

- \* DNS gave the best performance for sponge tolerance, oven spring and crumb cell structure.
- \* APH13 showed poor sponge tolerance , however the oven spring and crumb cell structure is good and acceptable.
- \* CWRS gave good sponge tolerance but the bread performance is poorest among all samples.



## Comparison 2 : APH13 (Kidman & Gascoigne blend), DNS and CWRS13.5 Blending ratio : 50 :50

Performance of open top white bread with wheat grist blending ratio - 50:50

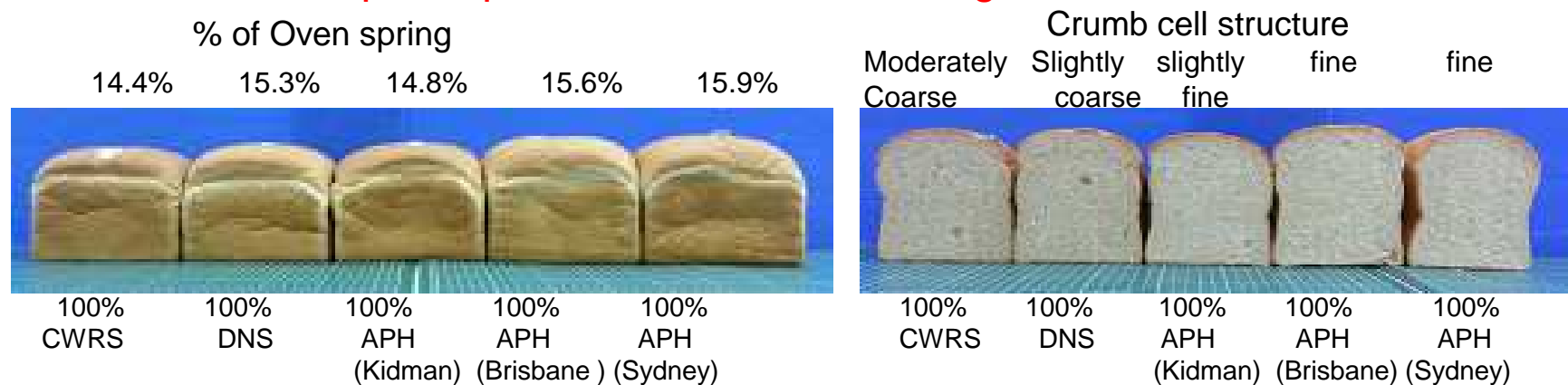


**Finding :**  
All samples showed insignificant difference in quality, oven spring and crumb cell structure



## Comparison 3 : APH13 (Kidman), APH13 (Loading port: Brisbane), APH13 (Loading port : Sydney), DNS and CWRS13.5 - Sponge and Dough method

Performance of open top white bread with wheat grist 100%



### Finding :

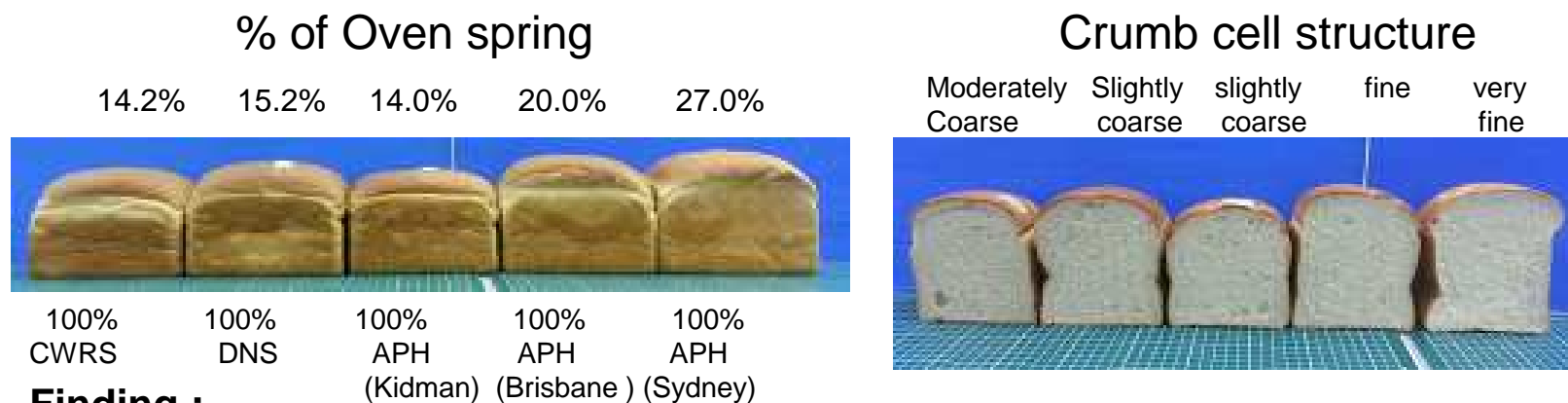
- \*Sponge tolerance : **DNS** > APH (Bris) > APH (Syd) > APH (Kidman) > CWRS
- \*Water absorption : **CWRS** > DNS > APH(Kidman) > APH( Bris ) > APH(Syd)
- \*Oven spring : **APH(Syd)** > APH (Bris) > DNS > APH(Kidman) > CWRS
- \*Crumb fineness : **APH(Syd)** > APH(Bris ) > APH(Kidman) > DNS > CWRS





## Comparison 4 : APH13 (Kidman ), APH13 (Loading port: Brisbane), APH13 (Loading port: Sydney), DNS and CWRs13.5 - No time Dough method

Performance of open top white bread with wheat grist 100%



### Finding :

- \*Water absorption : **CWRs** > DNS > APH(Kidman)> APH( Bris ) > APH(Syd)
- \*Oven spring : **APH ( Syd)** > APH ( Bris ) > DNS > CWRs > APH(Kidman)
- \*Crumb fineness : **APH( Syd)** > APH( Bris ) > DNS > APH(Kidman) > CWRs



## Findings:

- DNS gave the best water absorption and sponge tolerance.
- APH loaded from Sydney and Brisbane have similar oven spring to DNS and are better than CWRS and APH (Kidman)
- All APH gave a brighter and finer crumb structure than CWRS and DNS



# Summary

- Australian wheat performs well in noodles and biscuits when compared to Canadian/US wheat and wheats from other origins
- However, the new Canadian Hard White Wheat (CWHWS) also performed well in noodle and biscuit products and can be competitive against medium and high protein Australian Wheat



# Summary

- Canadian and US spring wheat perform better than Australian APH and AH wheat in bread products due to the predominance of the sponge and dough method in the region.
- The new varieties APH Kidman and Gascoigne develop for sponge and dough bread making shows positive performance when compared to CWRS and DNS. However the water absorption and sponge tolerance need improvement.



# Summary

- US wheat is perceived as inconsistent in quality but traditionally is used in Philippines and in Thailand it is mainly use in aquaculture
- Since deregulation we have encountered quality problems and inconsistency when buying Australian wheat in containers.



# Summary

- Medium/lower protein Black sea wheat can partially replace ASW/APW in biscuits, noodles and steam bread products
- Higher protein Black sea wheat can partially replace APH/AH and even North American spring wheat in bread
- Indian and Pakistan wheat can partially replace APW/ASW and is available at competitive prices but their quality is not preferred
- However Asian buyers still pay a premium for APW/ASW, the question is how much and for how long?



# Recommendations to improve Australian Wheat Competitiveness

- Consolidated annual crop quality reports and make it available to all buyers of Australian wheat.
- Introduce a centralized export quality inspection system like the FGIS and Canadian Grain Commission especially for containerised shipments.
- Make available a technical support center for customers and for growers to research into varieties suitable for customer's requirements.



# **Recommendations to improve Australian Wheat Competitiveness**

- Improve inland logistic to reduce logistic cost of moving wheat into export facilities
- Improve port logistics especially at WA to increase export capacity





# **Potential Use of Australian Soybeans in Asian food products**



# Soy Foods situation in SE Asia

- SE Asia accounts for 25% of the worlds' soy food consumption
- Annually 3.5 million tons of food soybeans is used to produce tempe, Tofu, soy milk etc.
- The main soybean suppliers are Canada and USA
- Our evaluation shows that certain varieties of Australian soybeans can perform well in soy milk and tofu



# South East Asia- Food Soybean Utilization 2011

Product Category	GM beans	Non GM beans	Total
Tempe	1,840,000	-	1,840,000
Tofu	700,000	40,000	740,000
Soy milk	500,000	80,000	580,000
Other soy products (soysauce)	200,000	-	200,000
Bakery, processed meat, TSP	-	10,000	10,000
<b>TOTAL</b>	<b>3,240,000</b>	<b>130,000</b>	<b>3,370,000</b>

Source: USDA and government data



# Quality requirements of a good food soybean

- High protein
- large & uniform seed size
- Clear hilum and yellow cotyledon
- Thin and yellow seed coat
- High soluble sugars for natural sweet taste
- 11s:7s ratios



# Comparison of Australian, Canadian and US soybeans in Tofu and Soy milk Production

	Australian non GM	Canadian GM	Canadian IP non GM	US GM
Moisture, %	10.8	12.9	11.7	11.5
Protein (dry basis),%	40.5	41.1	42.1	40.3
Oil, %	19.1	19.1	20.0	19.9
Water uptake factor	2.16	2.10	2.12	2.1
<b>Soy milk yield, g</b>	<b>2890</b>	<b>2820</b>	<b>2892</b>	<b>2780</b>
<b>Tofu yield, g</b>	<b>868.9</b>	<b>874.2</b>	<b>870.5</b>	<b>844.8</b>



Australian Non GM

Canadian GM

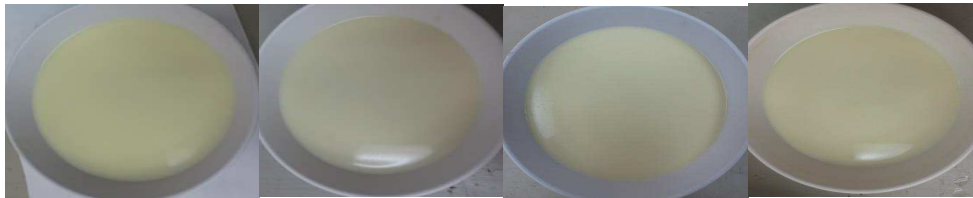
Canadian IP non GM

US GM



# Comparison between Australian, Canadian and US soybeans

Soy milk produced from different type of soybeans



Australian  
Non GM

Canadian  
GM

Canadian  
IP non GM

US GM



Tofu produces from different type of soybeans

## Findings :

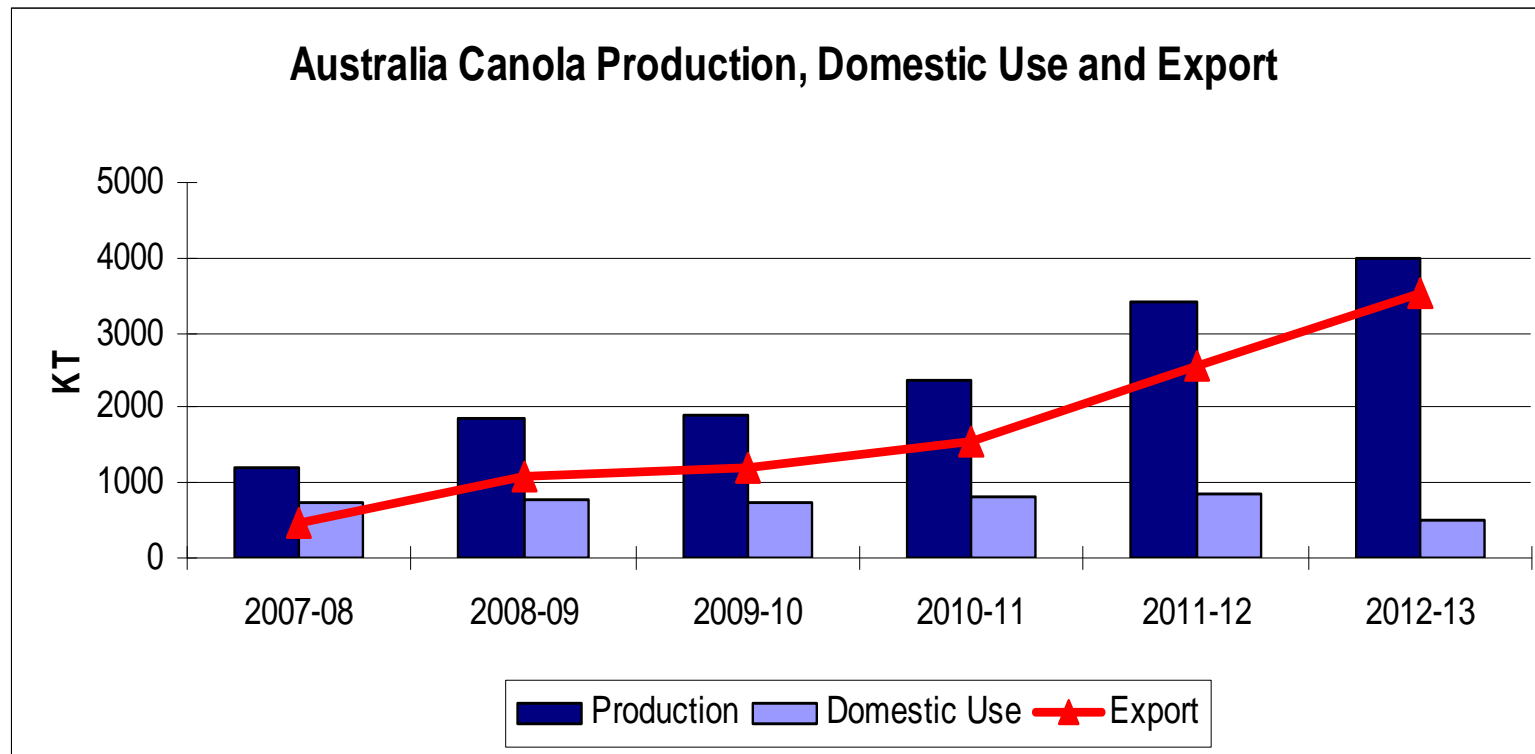
1. Tofu made from all the soybeans were soft and smooth.
2. Tofu made from Canadian GM bean has the highest yield (874 g), followed by Canadian IP non GM (870.5 g), Australian non gm (868.9g) and USA soybeans (844.8 g).
3. Overall, Canadian soybeans performed the best in soy milk and tofu, followed by Australian soybean and lastly US soybean.



# Potential for Australian canola in SE Asia



# Export for Australia Canola is increasing



Source: ABARES, 2014





# World Production of 12 Oilmeals

2009/10 -- 267.9 Mn T

1990/91 -- 137.0 Mn T



# Canola meal vs Soybean meal

- Lower metabolisable energy
- About 10% lower digestible amino acids
- Partly due to more extreme processing conditions
- Higher fiber content as commercial dehulling not successful unlike soybean meal.
- Higher methionine but lower lysine content
- Limitations on use in poultry feeds due to higher fiber and sometimes high glucosinolates content.



# **Better processing of canola meal can result in better broiler growth performances**

Location: Bangkok Animal Research Center

Date: 2<sup>nd</sup> Oct- 5<sup>th</sup> Nov, 2013

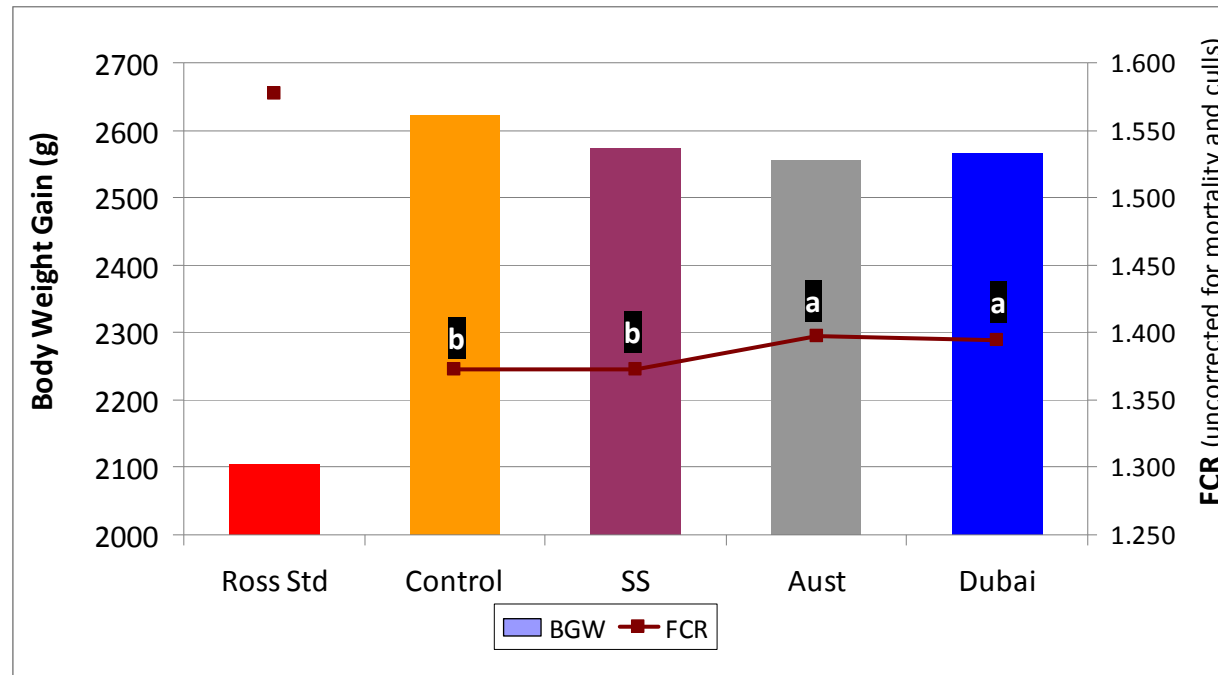


# Materials & Methods

- Birds: Total 312 of Ross male
- Trial replicates: 4 treatments x 6 replicates x 13 birds
- Treatments:
- T1- Diet with Dehulled soybean meal
  - T2- Diet using **SS solvent extracted canola meal**
  - T3- Diet using **Australian solvent extracted canola meal**
  - T4- Diet using **Dubai solvent extracted canola meal**
- Trial period: Starter (0 - 16 days) & Grower (17 - 34 days)
- Feeding program: Incorporation rate is 5% for starter and 10% for grower  
Feed & water were provided *ad libitum*  
Crumble form in diet (0-16 days); Pellet form in diet (17- 34 days)
- Measuring parameter:
- a.) Body weight gain
  - b.) Feed intake
  - c.) Feed conversion ratio (FCR)
  - d.) Mortality and cull
  - e.) Feces score
- All parameters subjected to analysis of variance as a randomized complete block design.



# Performance of Broilers (0- 34 days)



a,b,c Means within column with no common superscript differ significantly ( $p < 0.05$ )

<sup>1</sup> Ross 308 Standard Broiler Performance 2012

<sup>2</sup> Feed conversion rate corrected for mortality and culls.



# Findings

- Soon Soon canola meal performed the best among the canola meal diets and its performance is similar to the soybean meal control diet
- Therefore with proper processing the nutrient availability of canola meal can be improved
- Longer term, a commercial dehulling process for canola meal must be developed if poultry feeding is the main objective



# **Opportunities For The Use Of Lupins In Asian Foods And Animal Feeds**



# **Total Asian Imports and Consumption of Soybeans and Soybean meal for 2007**

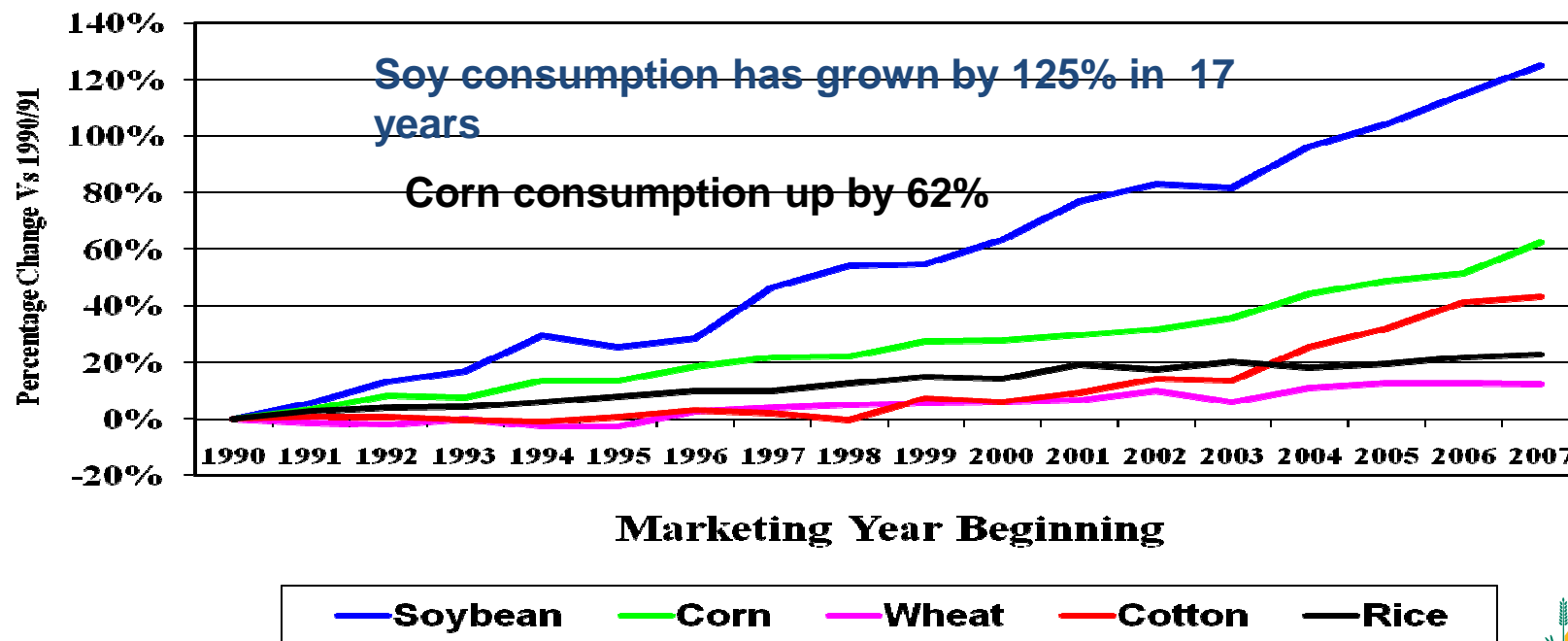
Soybean import:	45 Million tons
Soybean production:	25 Million tons
Total Soybean usage:	70 Million tons

Net Soybean Meal import: 9.6 Million tons

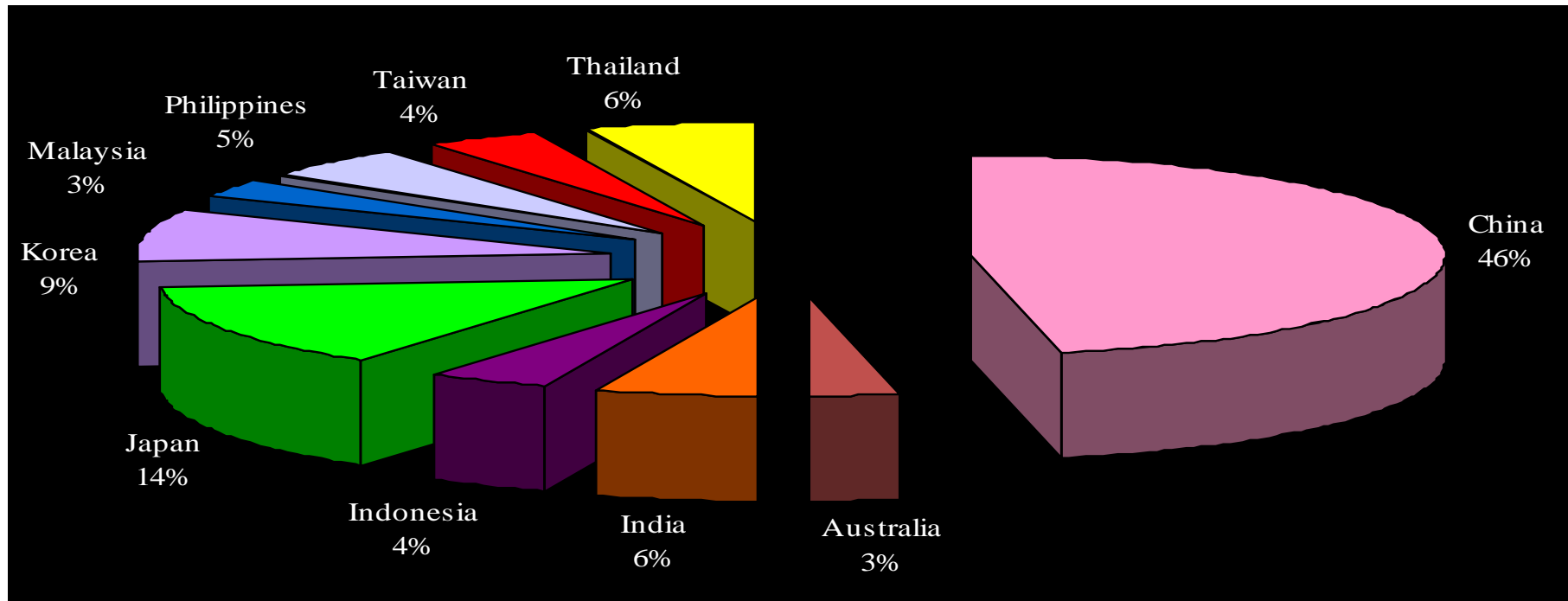




# Soybeans, Corn, Wheat, Cotton, and Rice Percentage Change in Global Consumption 1990/91 – 2006/07 and Forecast for 2007/08



# Size of Feed Production, 2007 (Asia Pacific)

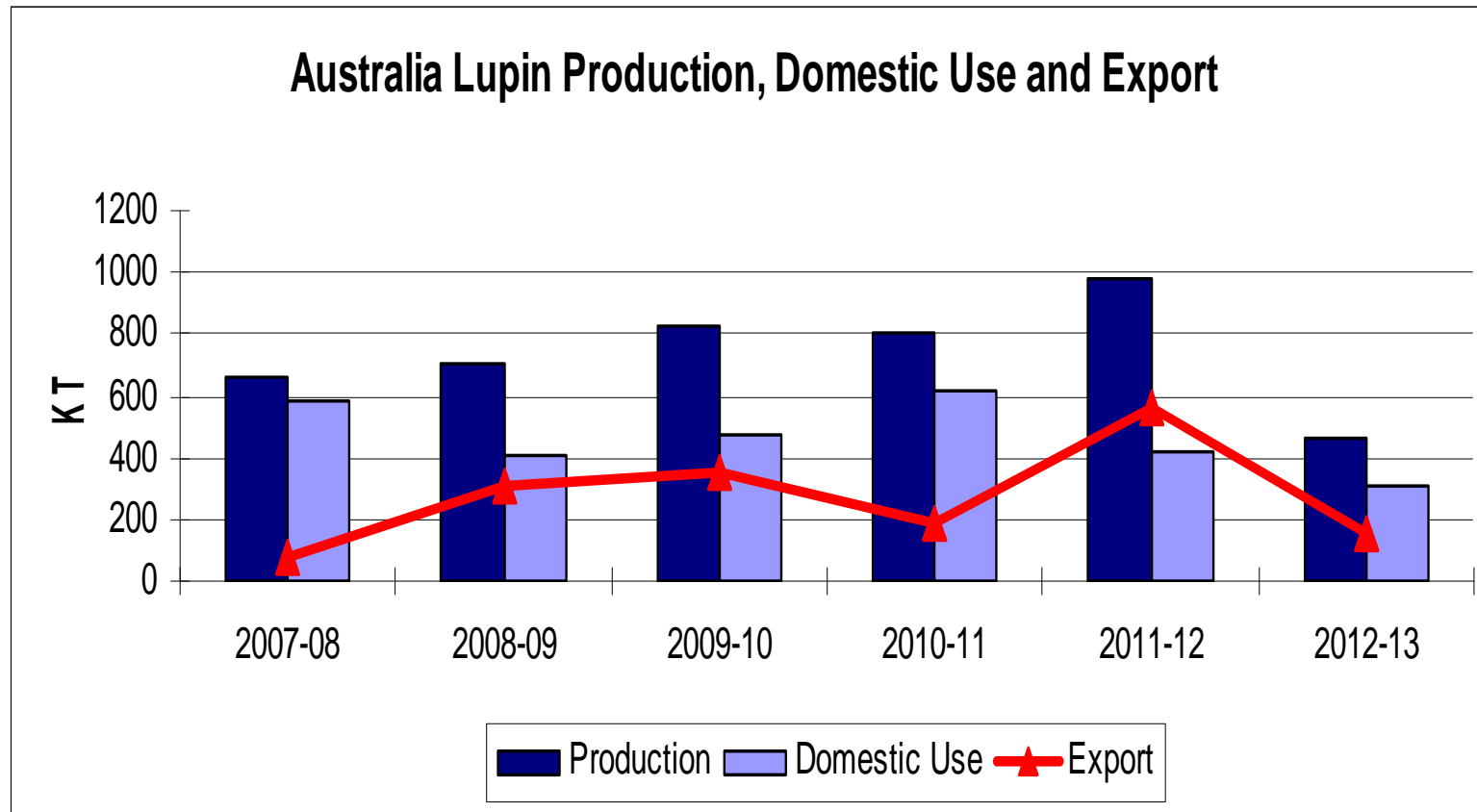


Total Production: 184.7 million tonnes

Source: Feed International, 2008



# Lupin production and export inconsistent



Source: ABARES, 2014



# Potential Use of Lupin In Asian Foods



# **WHO Global NCD Action Plan 2013-2020 – An Overview**

The WHO Global NCD Action Plan 2013-2020 provides a road map and a menu of policy options for Member States, WHO, international partners and private sector entities which, when implemented collectively, attain 9 voluntary global targets, including that of a 25% relative reduction in premature mortality from cardiovascular diseases, cancer, diabetes or chronic respiratory diseases by 2025



# WHO Global NCD Action Plan 2013-2020 – Targets

## Voluntary global targets

- (1) A 25% relative reduction in the overall mortality from cardiovascular diseases, cancer, diabetes, or chronic respiratory diseases
- (2) At least 10% relative reduction in the harmful use of alcohol, as appropriate, within the national context
- (3) A 10% relative reduction in prevalence of insufficient physical activity
- (4) A 30% relative reduction in mean population intake of salt/sodium
- (5) A 30% relative reduction in prevalence of current tobacco use in persons aged 15+ years
- (6) A 25% relative reduction in the prevalence of raised blood pressure or contain the prevalence of raised blood pressure, according to national circumstances
- (7) Halt the rise in diabetes and obesity
- (8) At least 50% of eligible people receive drug therapy and counselling (including glycaemic control) to prevent heart attacks and strokes
- (9) An 80% availability of the affordable basic technologies and essential medicines, including generics, required to treat major noncommunicable diseases in both public and private facilities



# Health benefits of lupin demonstrated in clinical trials

- Lupin flour incorporated into white bread significantly reduced the level of blood glucose. ( Hall R.S. et al. 2005)
- Lupin-enriched bread increases satiety and reduces energy intake. This may have important implications for weight management. (Lee et al., 2006)
- Lupin fibre acts as a soluble fibre and drops the total cholesterol without affecting the HDL cholesterol.
- The lupin-enriched diet lowered total blood cholesterol by 4.5 % and the LDL cholesterol by 5.4%. ( Hall R. S. et al., 2005)
- Lupin foods can improve bowel health because it reduces transit time , lower the colon pH ( anti cancer ) and act as a “pre-biotic” to improve bowel functions . ( Johnson S.K. et al., 2006)



# The potential use of lupins in Asian Foods is tremendous :

Much work has been done by Dr. Mark Sweentingham et al. using lupin to replace soybean in traditional Asian soy foods

Example :

- Soy milk
- Tofu
- Miso
- Shoyu
- Tempe





# **Soon Soon Group has undertaken research using lupin flour and fibre in Asian Food Products**

- Instant Noodles
- Cracker
- Bread
- Sausages



# Use of Lupin flour and fibre in instant noodles

- Lupin Flour was used at 6.8% and lupin fibre was used at 1.7% of the total formulation
- The noodles were evaluated for appearance, eating quality, oil and protein content as compared with control



# Use of Lupin flour and fibre in instant noodles

## Analysis of instant noodles incorporating lupin flour and fibre

	Laboratory Instant noodle samples			Commercial samples	
	Control	Sample with 6.8% Lupin flour	Sample with 6.8% lupin flour and 1.7% Lupin fibre	Control	Sample with 6.8% lupin flour
Moisture, %	3.8	4.2	4.1	2.5	2.4
Protein (dry basis), %	10.3	12.5	12.1	11.1	12.7
Dietary Fibre (dry basis) , %	4.3	7.1	8.8	3.6	6.4
Oil (dry basis),%	18.5	17.8	17.9	13.6	15.5

### Laboratory instant noodle samples

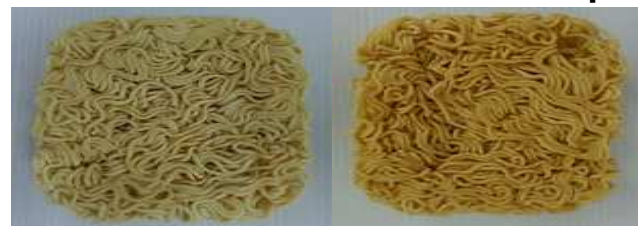


Control

Sample with 6.8%  
Lupin flour

Sample with 6.8%  
lupin flour and  
1.7% Lupin fibre

### Commercial instant noodle samples



Control

Sample with 6.8%  
lupin flour



# Use of Lupin flour and fibre in instant noodles

## Findings:

- Increase dietary fibre by 65-105%
- Increase protein level by 14 – 21%
- Noodle appearance more yellow than control
- Better soaking tolerance and eating quality



# Use of Lupin flour and fibre in Cracker

## Analysis of cracker incorporating Lupin flour and Fibre

	Control	Sample with 5.8% Lupin flour and 1.5% lupin fibre
Moisture, %	2.8	3.1
Protein ( dry basis ). %	12.3	12.7
Dietary Fibre ( dry basis). %	3.1	7.0

### Laboratory cracker samples



Control

incorporating with  
5.8% Lupin flour  
and 1.5% Lupin fibre

### Findings:

- Dietary fibre increased by 125%
- Minimal protein increment, 3%
- No difference in cracker appearance and eating quality



# Use of Lupin flour and fibre in Bread

## Analysis of breads incorporating Lupin flour

	Control	Sample with 7% Lupin flour
Protein content, as is (%)	11.2	16.7
Dietary fibre, as is (%)	1.73	4.45

### Laboratory bread samples



### Findings:

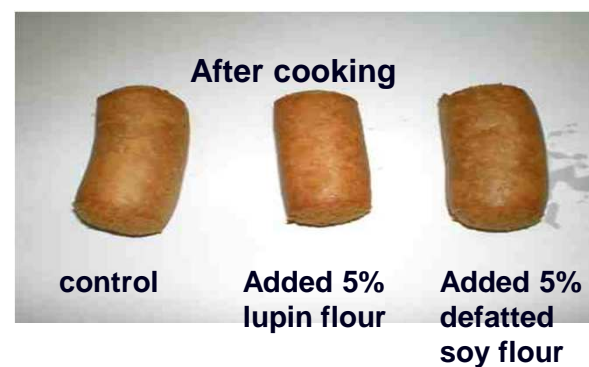
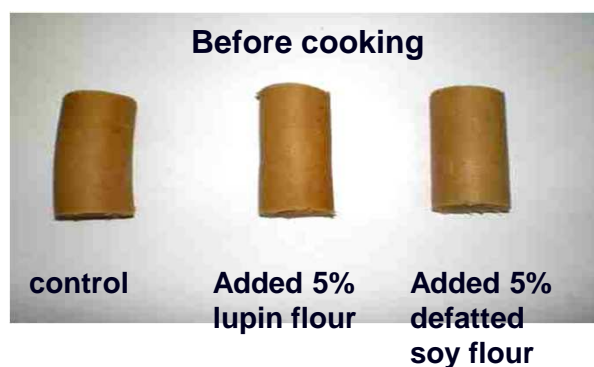
- Dietary fibre increased by 157%
- Protein increased by 49%
- Internal crumb colour is much more yellowish than Control



# Use of Lupin flour in sausages as a meat extender compared with Soy flour

Table 4: Moisture and oil content in sausages made from lupin flour, defatted soy flour and control

	Control	Added 5% lupin flour	Added 5% defatted Soy flour
Moisture (%)	55.3	60.4	61.5
Oil content (%)	4.19	5.36	2.92



# Use of Lupin flour in sausages as a meat extender

## Findings:

- Significantly higher moisture content after cooking compared with control
- Indistinguishable in taste from Control and the sausage using soy flour
- No shrinkage was observed after cooking
- Darker sausage colour





# **The Use of Lupins in Animal Feedings**



# Dehulled Pre-Emulsified Full Fat Lupin Meal

## Specification

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Moisture	% max	12.0
Protein	% min	35.0
Crude Fibre	% max	4.5
Ash	% max	4.5
Ether Extract	% min	15.0

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# Nutrient Matrixes

Item	FF Lupin meal
Crude Protein, g/kg	360
ME Poultry, MJ/kg	13.6
Crude Fat, g/kg	160
Crude Fibre, g/kg	38
Digestible Lysine, g/kg	16.12
Digestible Methionine, g/kg	2.51
Digestible M+C, g/kg	8.16
Digestible Tryptophan, g/kg	2.29
Digestible Threonine, g/kg	12.54
Digestible Arginine, g/kg	38.39
Digestible Isoleucine, g/kg	16.06
Digestible Valine, g/kg	14.63



# **Broiler Feeding Trial**

Conducted at BARC

24th January – 9th February 2012



# Materials & Methods

Birds: 480 Arbor Acres Plus male

Trial replicates:

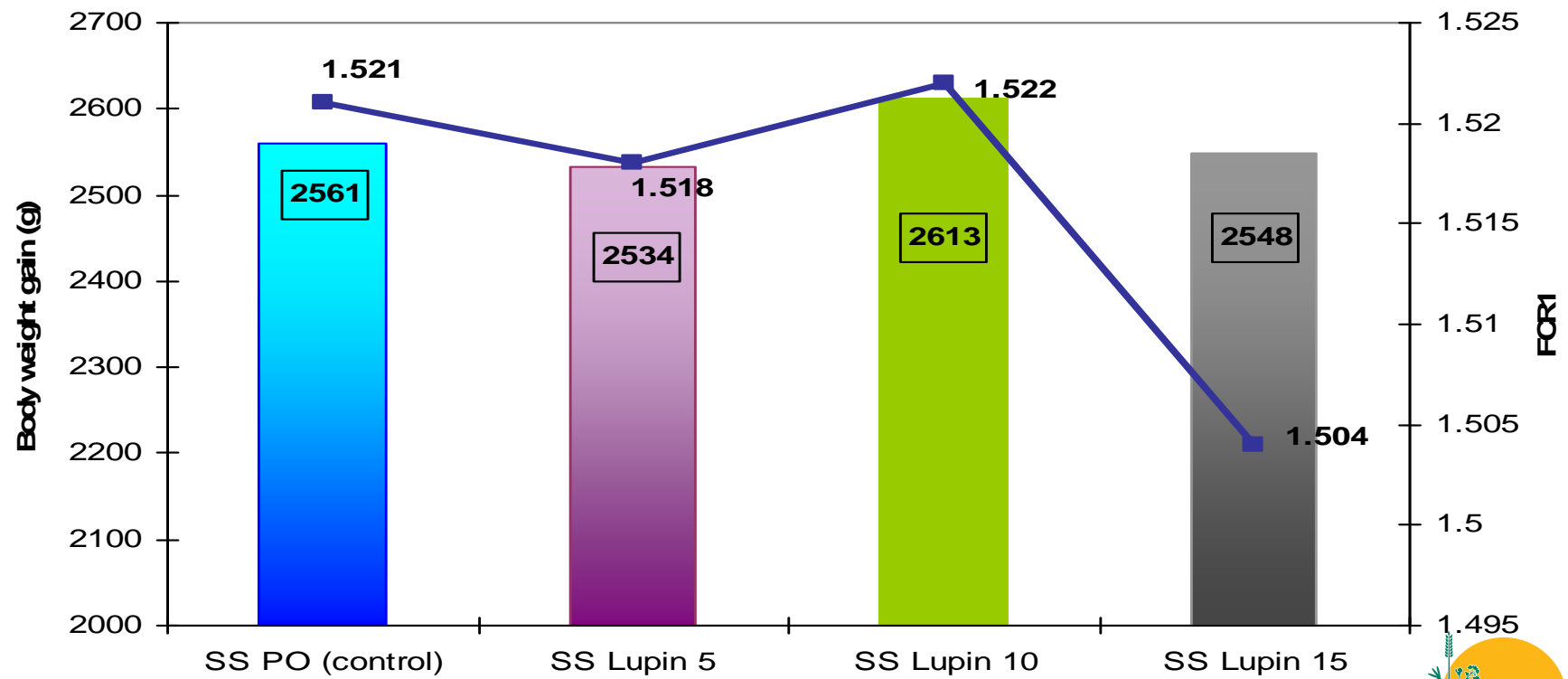
- 5 treatments x 6 replicates x 16 birds

Treatments

1. Diet with dehulled soybean meal plus Palm Oil (as a control diet)
2. Diet using 5% Dehulled Full Fat Lupin meal
3. Diet using 10% Dehulled Full Fat Lupin meal
4. Diet using 15% Dehulled Full Fat Lupin meal



### Growth Performance of Broiler (0-34 days of age)



# Findings

- No significant difference shown in final body weight, body weight gain and FCR among all the diets.
- Numerically, the birds fed 10% full fat lupin meal has the highest body weight gain (2613 g) while those fed 5% full fat lupin meal has lowest body weight gain (2534 g).
- Full fat lupin meal usage did not have negative effect on feed intake.
- All treatments showed good livability ( $\geq 95\%$ ) and normal feces score.
- Overall, the use of full fat lupin meal at up to 15% in broiler diets did not have and adverse effect on growth performance.

**Pig Feeding Trial conducted by  
Soon Soon replacing 75% of  
the soybean meal with a sweet  
lupin meal specially processed  
to maximize nutrient  
availability**





# **Trial conducted at University of Agriculture Malaysia**

Method and Material

Pigs :

- 60 cross bred starter pigs  
(Landrace x Large White x Duroc)

No of treatment :

- 2 treatments with 30 starters in each group

No of replicate :

- 10 replicates per treatments
- 3 starters per pen; total of 20 pens were used

Duration of trial :

- 56 days (8 weeks)



# Measuring Parameters

- ❖ Average Daily Gain (ADG)
- ❖ Average Daily Feed Intake (ADF)
- ❖ Feed Conversion Ratio (FCR)



# Results

	Control Diet	Lupin Diet
Initial body weight (kg)	21.93 ± 0.73 <sup>a</sup>	22.21 ± 0.63 <sup>a</sup>
Average feed intake (kg/day/pig)	1.59 ± 0.06 <sup>a</sup>	1.36 ± 0.05 <sup>b</sup>
Final body weight (kg)	53.93 ± 1.71 <sup>a</sup>	53.42 ± 1.47 <sup>a</sup>
Total Live weight gain, g/day/pig	571.43 ± 16.18 <sup>a</sup>	563.90 ± 17.15 <sup>a</sup>
Feed conversion ratio	2.79 ± 0.10 <sup>a</sup>	2.41 ± 0.09 <sup>b</sup>



## Findings

- Initial body weight, total live weight gain and final body weight were not statistically significant ( $P > 0.05$ ).
- Feed intake and feed conversion ratio for the pigs offered the lupin diet was significantly lower ( $P < 0.05$ ) by 13.6%



# Issues with the use of Lupins in Asian Food and Feed

- Supply has not been consistent
- Although much research has been done with Lupins replacing soybeans in tofu and soymilk ,but in reality Asian consumers cannot accept the difference in taste.
- Lupins may have to create its own niche instead of just replacing soybeans in Asian Soy foods.
- No health claims are allowed for Lupins at the moment
- The potential use of Lupins in Asian aquaculture, poultry and swine feeding is tremendous.
- For effective use in aquaculture, poultry and swine Lupins should be dehulled



# A New Opportunity for Lupins

- Most of the soybeans grown in USA, Brazil and Argentina are genetically modified (GMO)
- Most of the consumers are resistant to GMO foods
- Lupins are non GMO, it can be a cost effective non GMO replacer for soybeans



# Take home messages

- Australian wheat is more competitive in SE Asia post deregulation, and containerised shipments have increased
- Quality of Australian wheat in containerised shipments has deteriorated post deregulation
- Black Sea wheat can be competitive in quality and their prices can discount Australian wheat by up to USD50/mt at certain times of the season
- Australian canola has the potential to satisfy the increasing demand for canola oil and meal in SE Asia but it has to compete with Black Sea Canola at certain times of the year



## Take home messages

- Certain varieties of Australian soybeans can perform well in soy milk and tofu when compared with Canadian and US Soy beans
- With the WHO's current programme of reducing non Communicable diseases (NCDs) by 25% by 2025, lupins have a potential to be incorporated into Asian food products
- Dehulled lupin meal can replace soybean meal in aquaculture poultry and swine feeding







Department of  
Agriculture and Food



**GRDC** Grains Research &  
Development Corporation  
Your GRDC working with you

# Questions?

*Dr. Soon-Bin Neoh*

Soon Soon Group of Companies

2448, Lorong Perusahaan 2,

Prai Industrial Estate

13600 Prai ,Penang, Malaysia

*Email :neohsb@soonsoongroup.com*

