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Canola oil processing and implications for frying life

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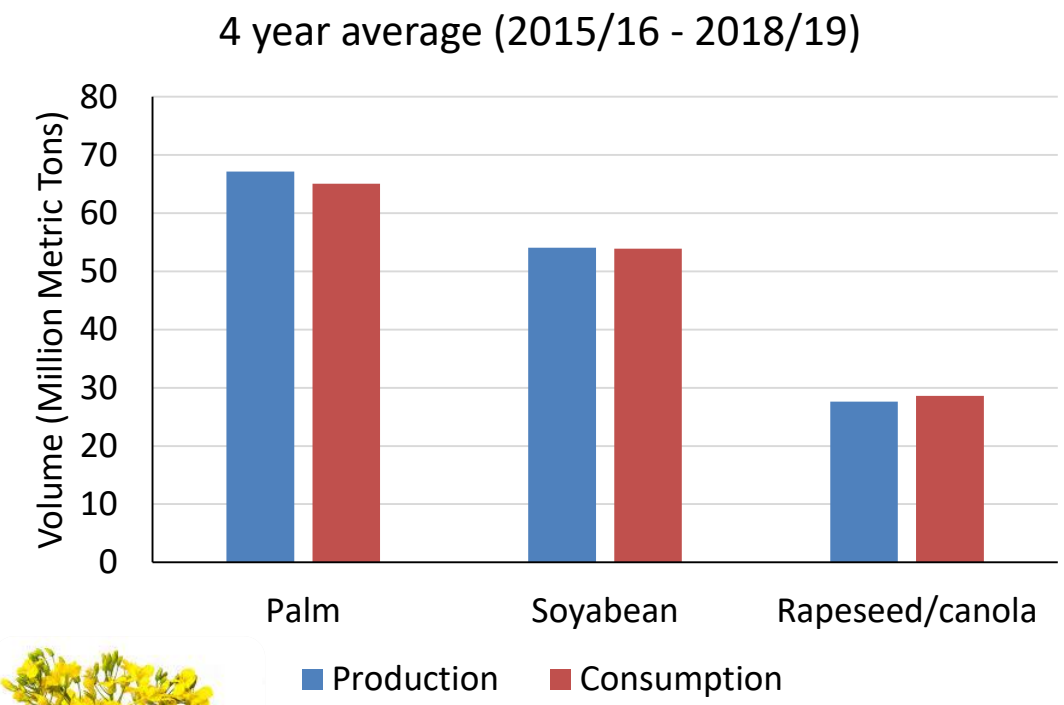
Processing and functionality

- Processing of foods – emergence of new technologies.
  - Ultrasound
  - Ohmic heating
  - High pressure processing
- Net effect
  - Greater nutrient retention
  - Less damage to heat sensitive products
  - Value addition
  - Enhanced product functionality and performance

Canola oil



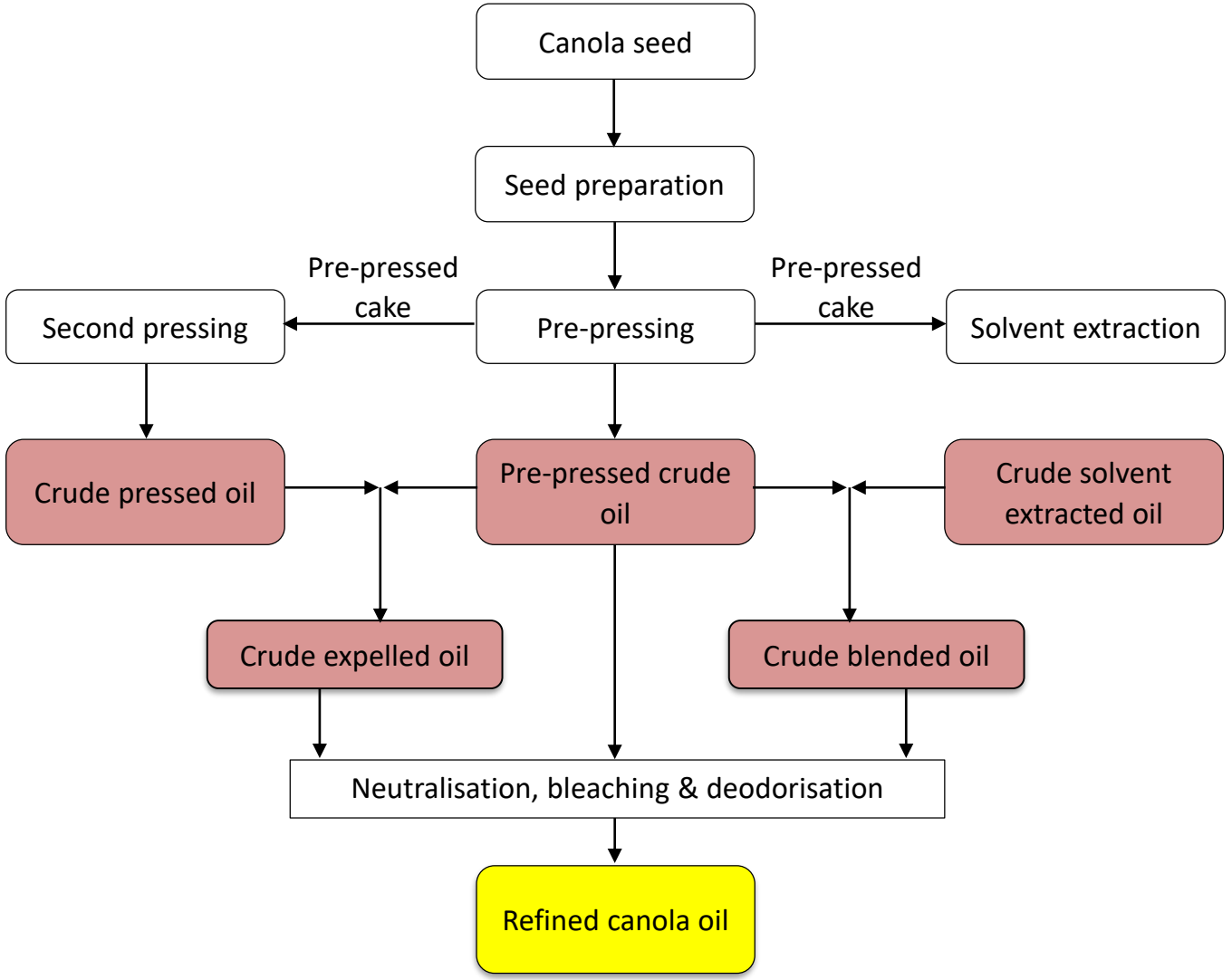
- Canola oil is the third most economically important vegetable oil
  - — production
  - — domestic consumption

  - balanced fatty acids composition –
    - oleic acid (50 – 70%)
    - linoleic acid (15 – 30%)
    - linolenic acid (5 – 14%)
    - saturated fatty acids (<8%)

Canola oil differentiation

1. Breeding approach – High oleic acid, high omega 3.
2. Further processing – speciality fats and bakery shortenings.
3. Designer oils – antioxidants, antifoaming agents, blending with other oils.
4. Intelligent processing techniques.

Canola oil processing



Aim of study

- Effect of processing on frying life of canola oil.

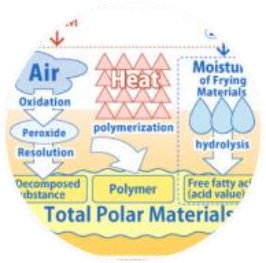
Frying exercise

Oil sampling

- 2 refined blended canola oils
  - BlCanO-1
  - BlCanO-2
- 2 refined expeller canola oils
  - ExCanO-1
  - ExCanO-2

Frying process

- Potato chips for 3 to 4 consecutive days
- 180 ± 5°C, 4 days
- Food: ratio = 1: 10



Frying life assessment

- Total polar materials (TPM)
- Free fatty acids
- Tocopherols
- Antioxidant activity

Initial oil quality

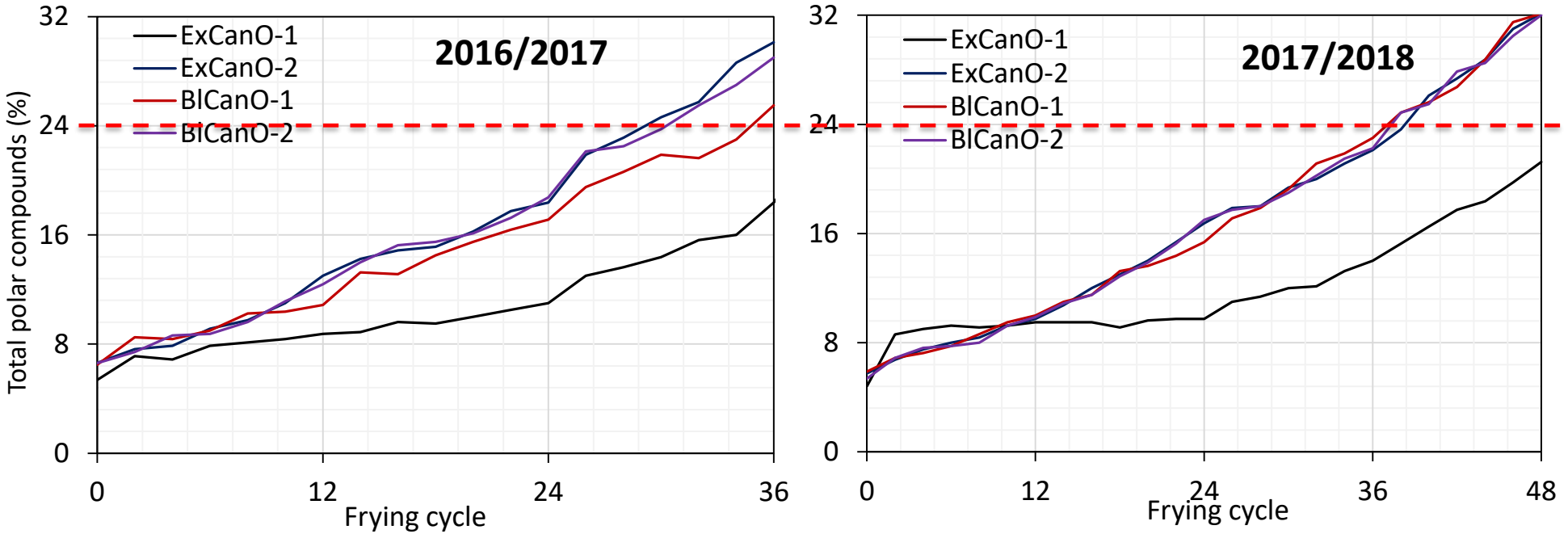
Oil type	Season	Free fatty acids (%)	Peroxide value (mEq O_2/kg Oil)	p-Anisidine Value	Tocopherols (mg/Kg)
ExCanO-1	2016/2017	0.06±0.001	$0.79±0.004^{b,k}$	$1.29±0.04^{ab,k}$	$616±4.88^{c,l}$
	2017/2018	0.06±0.001	$0.80±0.05^{c,k}$	$1.15±0.04^{b,k}$	$742±6.61^{a,k}$
ExCanO-2	2016/2017	0.05±0.004	$0.39±0.001^{a,k}$	$1.18±0.02^{a,l}$	$626±1.80^{b,k}$
	2017/2018	0.04±0.002	$0.53±0.03^{b,l}$	$0.84±0.04^{a,k}$	$652±9.69^{c,k}$
BlCanO-1	2016/2017	0.05±0.000	$0.42±0.03^{a,l}$	$1.85±0.01^{c,l}$	$610±1.22^{c,l}$
	2017/2018	0.06±0.001	$0.35±0.001^{a,k}$	$1.27±0.06^{b,k}$	$640±4.98^{c,k}$
BlCanO-2	2016/2017	0.05±0.002	$0.58±0.02^{a,k}$	$1.55±0.15^{b,l}$	$682±4.99^{a,k}$
	2017/2018	0.04±0.000	$0.54±0.04^{a,k}$	$0.91±0.11^{a,k}$	$685±8.99^{b,k}$

Fatty acids composition

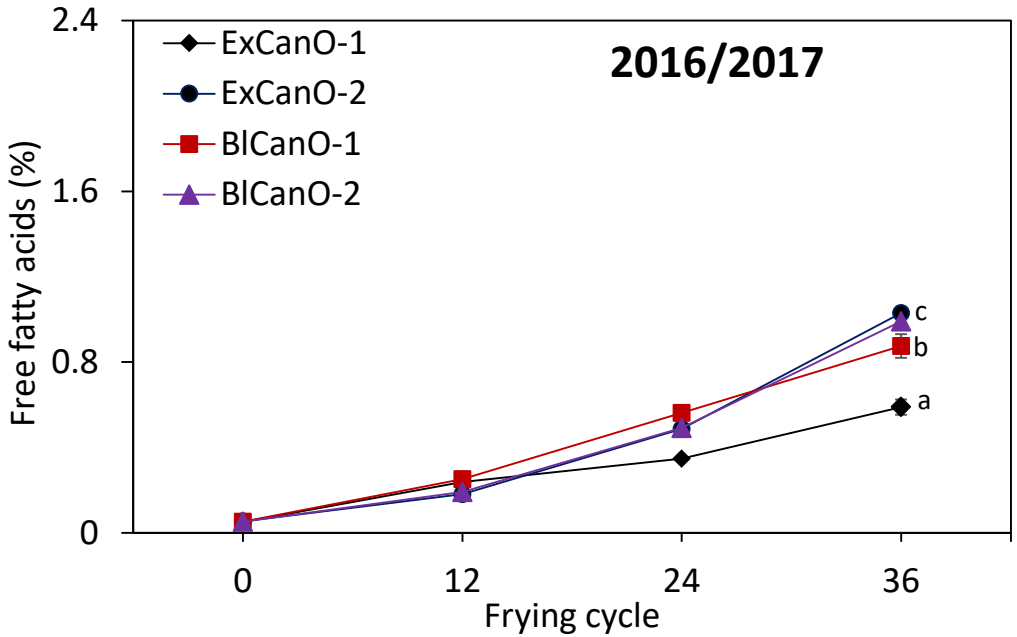
Season	2016/2017			
Fatty acid	ExCanO-1	ExCanO-2	BlCanO-1	BlCanO-2
C16:0	4.11±0.00	4.05±0.01	4.65±0.00	4.17±0.01
C18:0	1.98±0.00	2.07±0.00	1.86±0.01	2.03±0.01
C18:1	63.0±0.01	62.4±0.00	59.7±0.04	61.3±0.02
C18:2	18.3±0.00	18.7±0.02	20.8±0.01	19.4±0.02
C18:3	9.78±0.01	10.1±0.01	10.3±0.07	10.3±0.01
	2017/2018			
C16:0	4.07±0.01	4.03±0.01	4.19±0.01	4.15±0.01
C18:0	1.85±0.00	1.90±0.00	1.86±0.00	1.84±0.01
C18:1	64.5±0.01	62.3±0.01	61.0±0.02	61.2±0.01
C18:2	17.5±0.01	19.6±0.01	20.1±0.01	20.3±0.01
C18:3	9.26±0.01	9.69±0.01	9.63±0.01	9.74±0.02

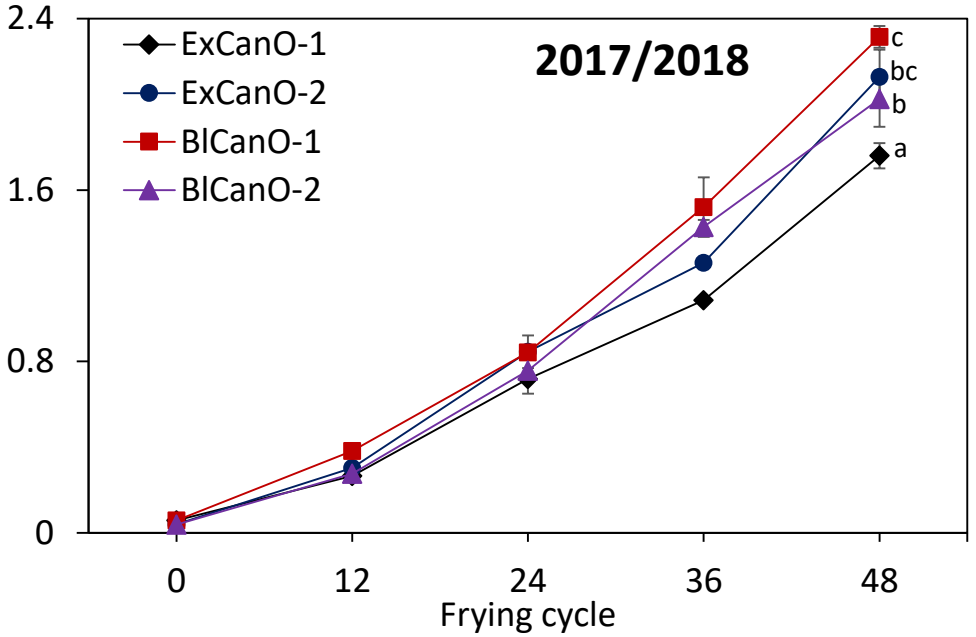
Results

Frying life of canola oil

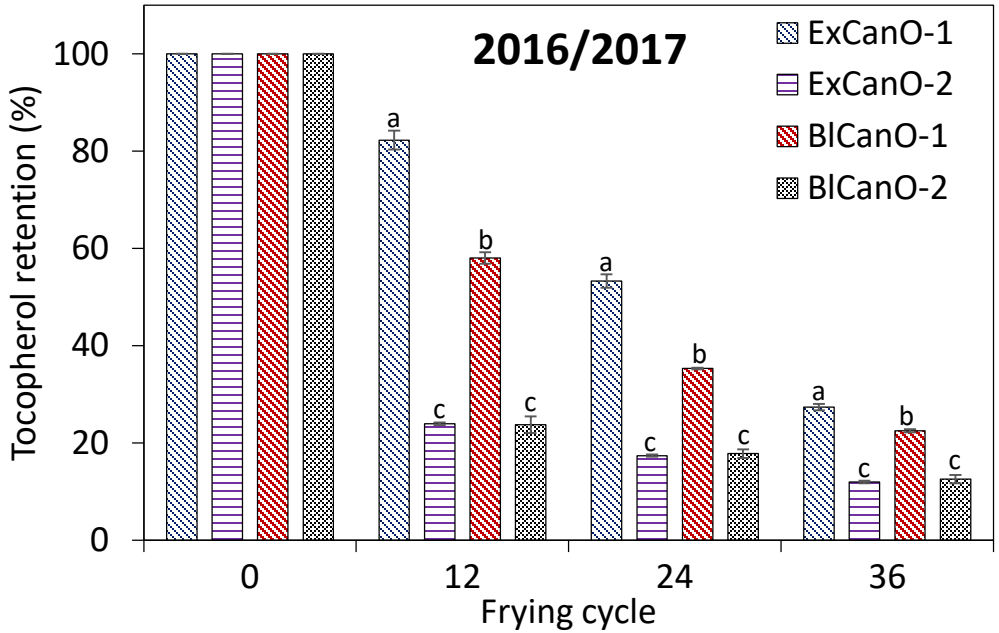


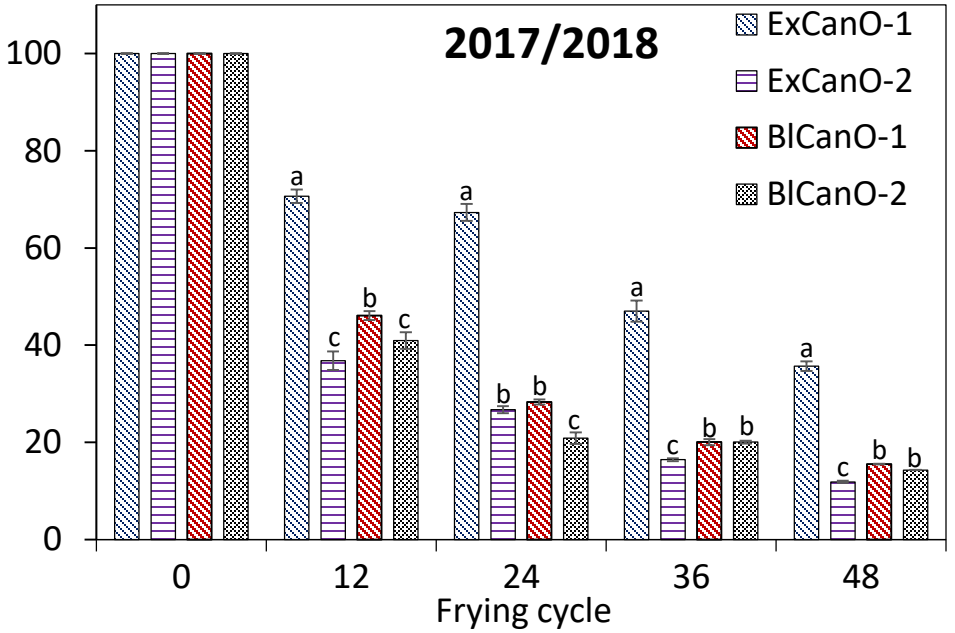
Free fatty acids content



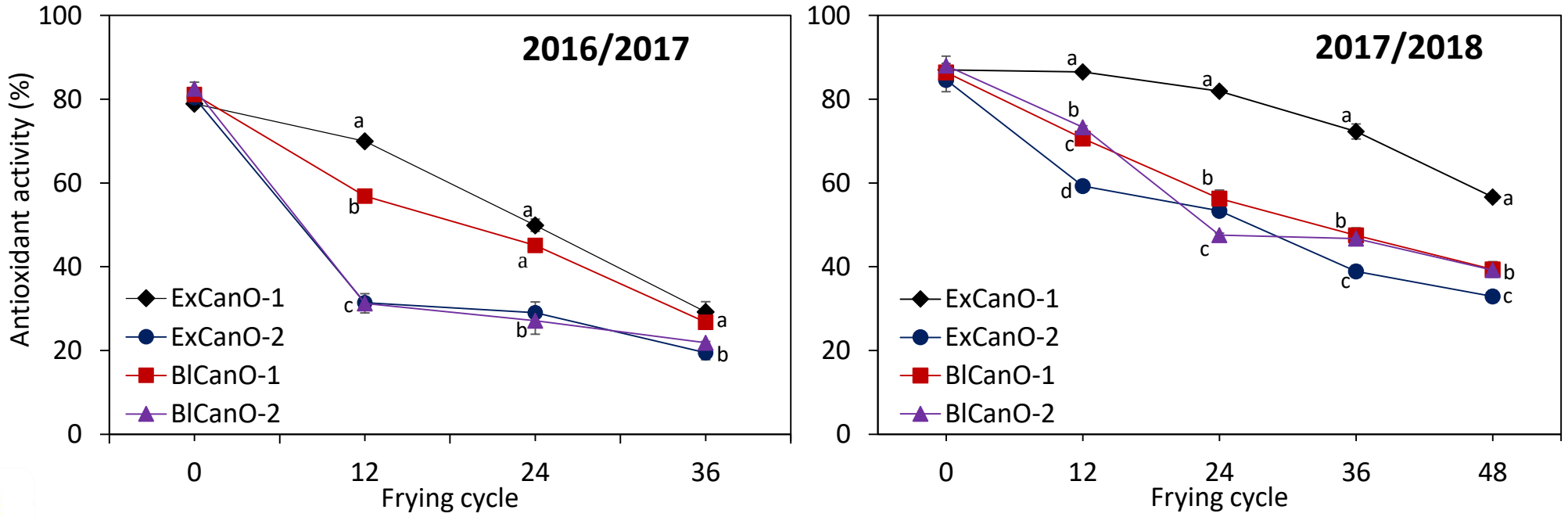


Tocopherols retention





Antioxidant activity



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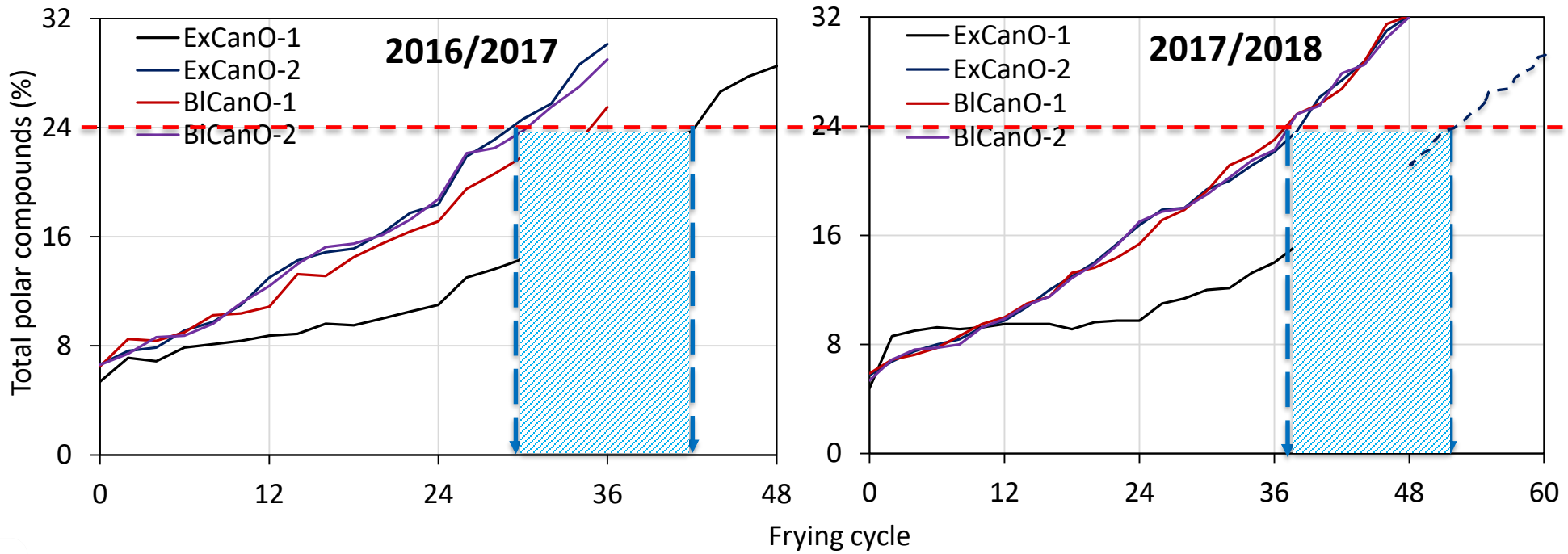
Conclusions

1. Value of additional stability:

— Processing influenced the frying life.

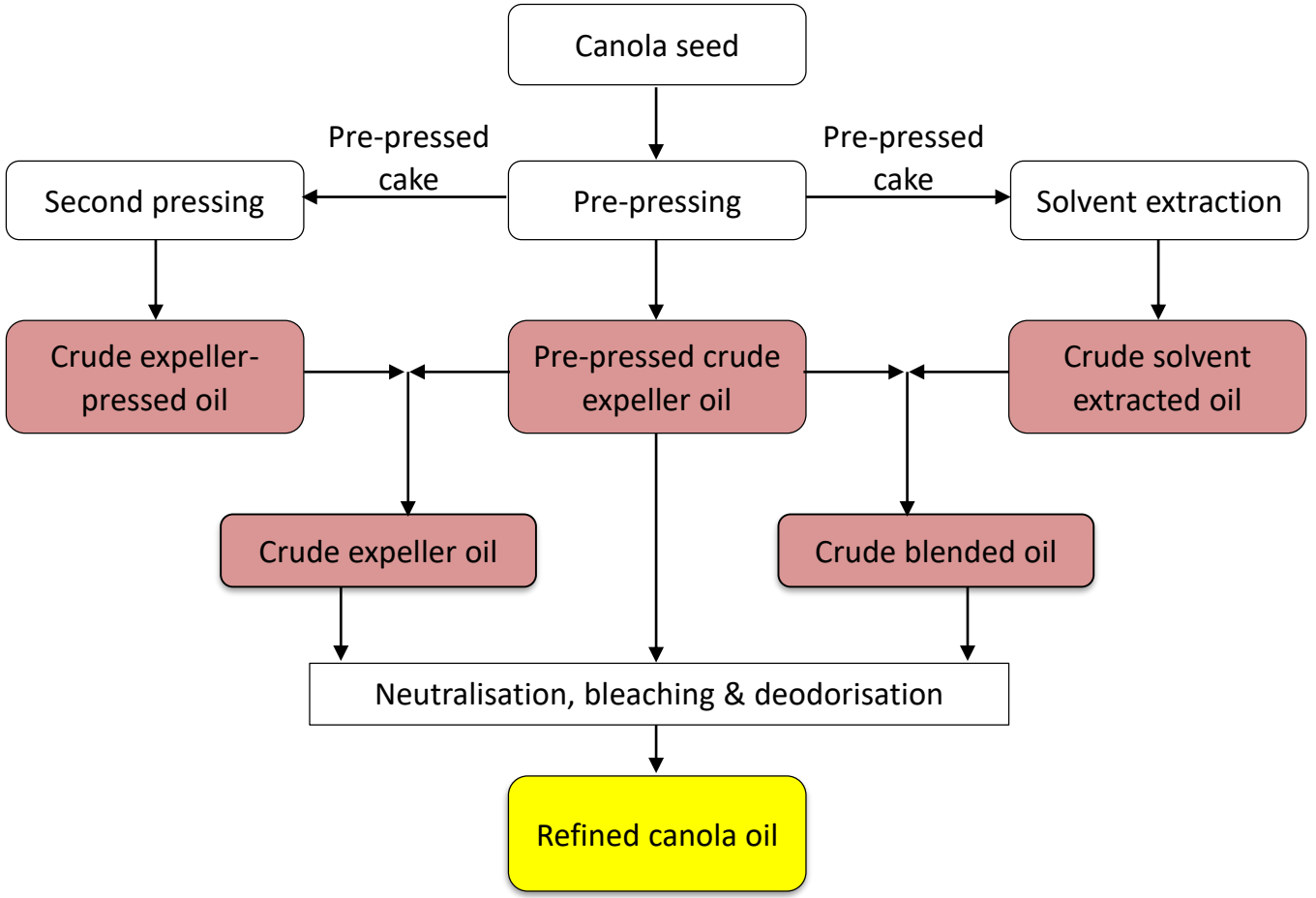


- 24 – 30% increase in frying life
- approx. 13 – 16 more frying cycles
- approx. 6.5 – 8 additional frying hours

2. Drivers of stability:

— Differences are processor driven.

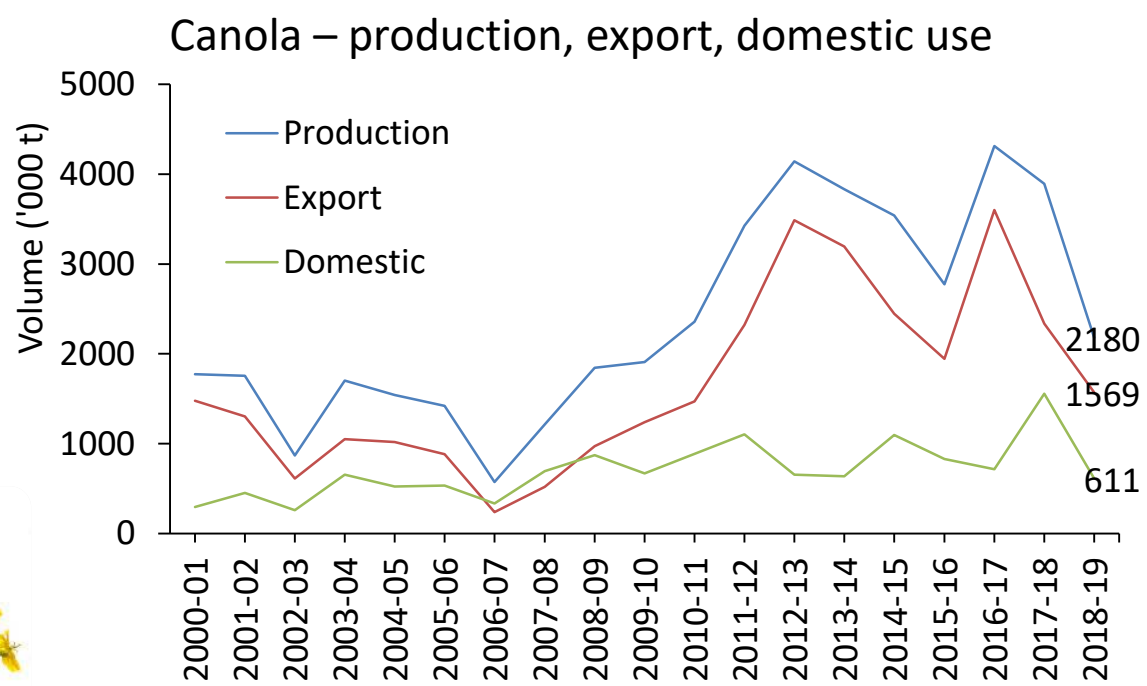
- Different chemistries in oils produced by different processing techniques.

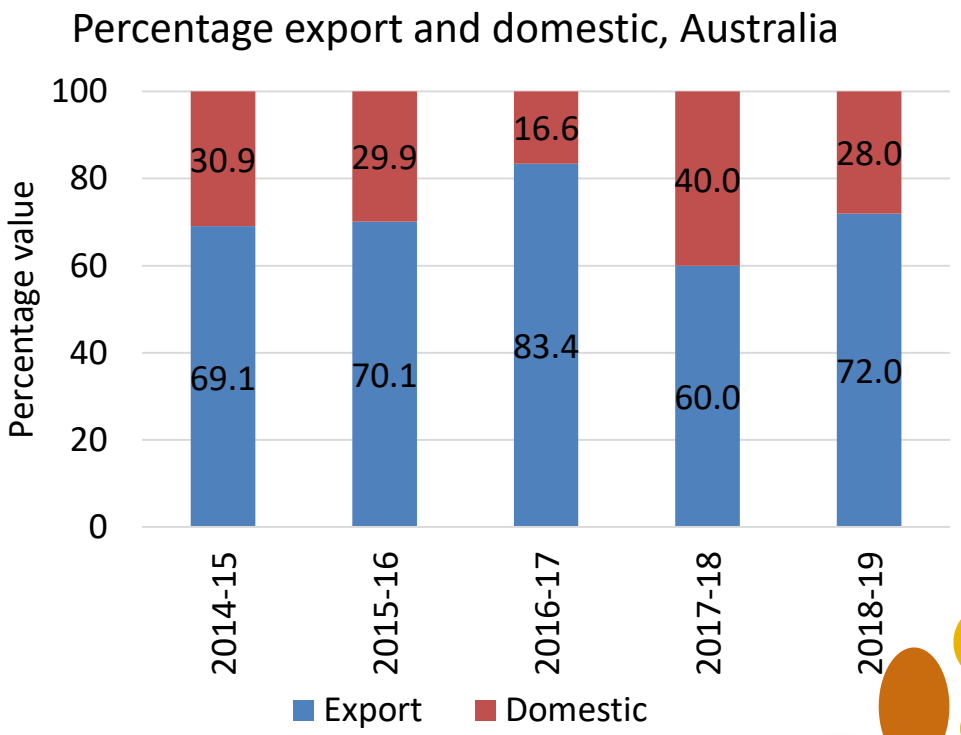


3. The big picture

— Different processing practices can enhance the commercial value of canola oil.

- Product differentiation – value to end users, better return for processors and profitability for growers.





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Australian Government
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GRAHAM CENTRE for Agricultural Innovation

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Australian canola oil processors who supplied samples for this study

ARC Industrial Transformation Training Centre for Functional Grains