

An Analysis of the Effect of Milk Compositional Standard On the Profitability of Ontario Dairy Farms

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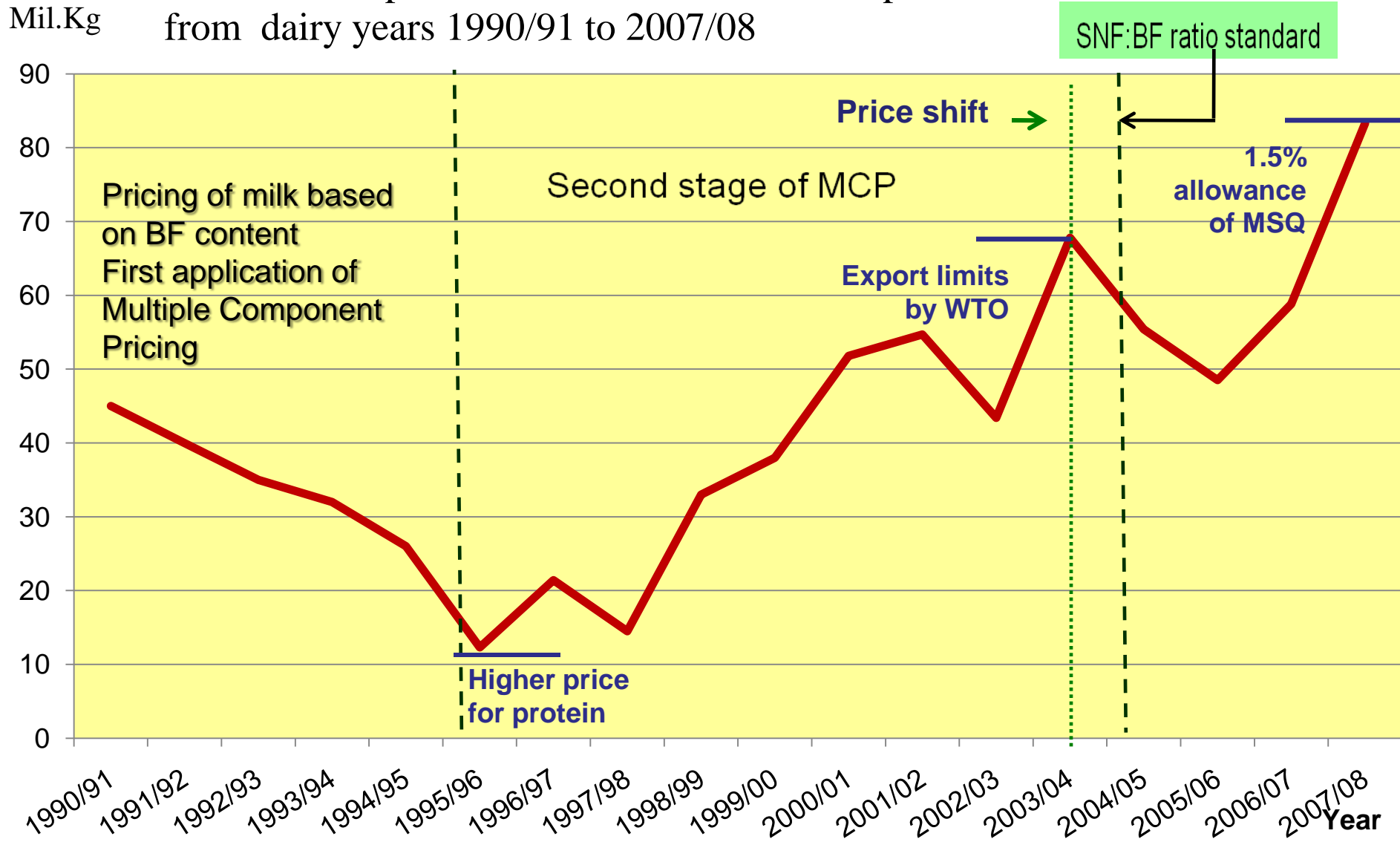
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What is the focus?

- Fluid milk at farm level, joint products of Solid-non-fat (SNF) and butterfat (BF)
- Initially payments on all milk solids
 - increased production of SNF
- Structural Surplus of Skimmed Milk Powder
- Solid Non Fat (SNF) : Butterfat (BF) ratio standard & component price change

Structural Surplus of Skimmed Milk Powder produced in Canada from dairy years 1990/91 to 2007/08



Source: Coyle (2005)



Research Question

Do the SNF:BF ratio regulation and the price shift influence the profitability of Ontario dairy farms?

Key Literature

- Output quality-oriented standards and profitability

Helfand (1988)

- Different forms of standards. Standard on pollution per unit of output results decrease profits.

Hatcher (2007)

- ratio standards make a difference to the optimal decision rules derived for a profit-maximizing firm.

More(2009)

- Milk quality standard has a range of economic consequences which may affect farm profitability.

Conceptual Framework of Farm Profit Maximization

$$\max \pi = (p_1 - m)y_1 + (p_2 + m)\bar{y}_2 - w_1x_1 - w_2x_2$$

$$S. t. \quad f_2(y_1, x_{12}, x_{22}, z) \leq \bar{y}_2$$

$$f^1(y_2, x_{11}, x_{21}, z) \leq \theta_R \bar{y}_2$$

where,

x_1, x_2 = inputs ; w_1, w_2 = input prices; z = farm characteristics

p_1, p_2 = protein price, BF price ; m = price shift from protein to BF

$f_2(y_1, x_{12}, x_{22}, z)$ = BF prod. function $f_1(y_2, x_{11}, x_{12}, z)$ = protein prod. function

\bar{y}_2 = BF production under quota ; θ_R = SNF:BF ratio standard

Effect of SNF:BF ratio standard on profit

$$\frac{\partial \pi^*}{\partial \theta_R} = \left\{ \begin{array}{ll} \lambda_2 \bar{y}_2 & \text{if } \lambda_2 > 0 \\ 0 & \text{if } \lambda_2 = 0 \end{array} \right\} \dots(1)$$

Effect of component price change on profit

$$\frac{\partial \pi^*}{\partial m} = \left\{ \begin{array}{ll} \bar{y}_2 - y_1 > 0 & \text{if } \bar{y}_2 - y_1 > 0 \\ \bar{y}_2 - y_1 < 0 & \text{if } \bar{y}_2 - y_1 < 0 \end{array} \right\} \dots(2)$$

Empirical Framework

Estimation of a regression model to test the effect of SNF: BF ratio standard and the component price change on dairy farm profitability

$$\begin{aligned}\pi_{it} = & \beta_0 + \beta_1 \text{STANDARD}_{it} + \beta_2 \text{PS}_{it} \\ & + \beta_{fc} \text{ Farm Characteristics} + \beta_{fo} \text{ Farm Operator Characteristics} \\ & + \beta_{tsc} \text{ Technology} + \beta_{tr} \text{ Trend}_{it} + u_{it}\end{aligned}$$

$$\pi = TR - TC$$

Data

- Data sources:
 - ✓ Ontario Dairy Farm Accounting Project (ODFAP)
 - Physical, financial and technical data
 - Rotating Panel data: 1996-2008, 60-80 farms per year
 - ✓ Dairy Farmers of Ontario, Statistics Canada

Description of Variables

Dairy returns to management (\$)

Direct revenue dairy-direct expenses dairy-allocation of indirect and overhead expenses-labour allocation expenditure

SNF:BF ratio standard

1 = After imposition of the standard (i.e. ≥ 2005)

0 = Before imposition of the standard (i.e. < 2005)

Component price change

1 = After the component price change (i.e. ≥ 2004)

0 = Before the component price change (i.e. < 2004)

Results

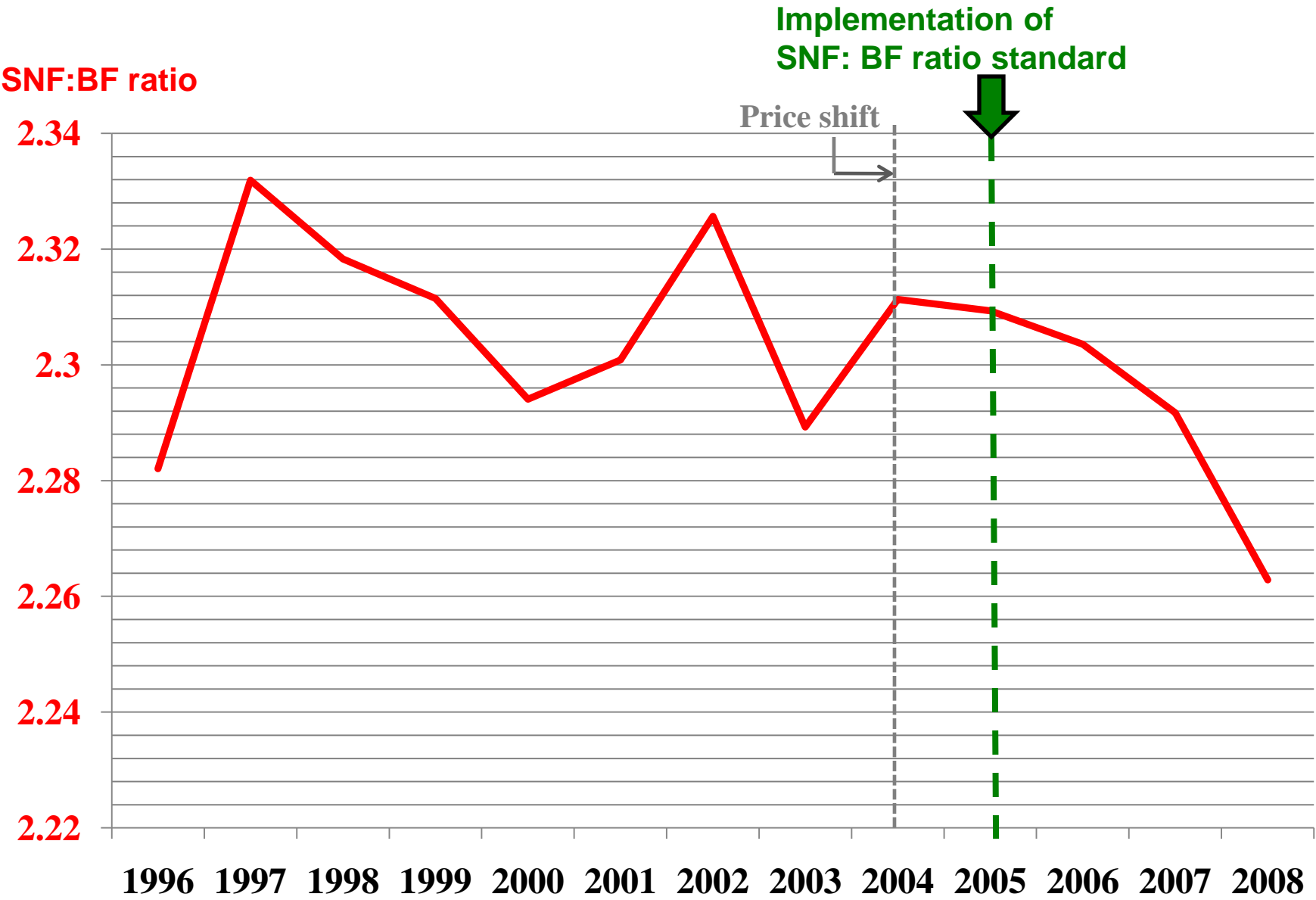
Dairy returns to management regression model

Policies

Variable	Model 1	Model 2	Model 3
SNF:BF ratio standard	-248 NS	7663NS	-
Component price change	21175***	-	21093***

*** Statistically Significant at 1% significance level , NS –Not Significant

SNF:BF ratios of the sample of Ontario dairy farms over the period from 1996 to 2008



Source: ODFAP data, Calculations using SPSS

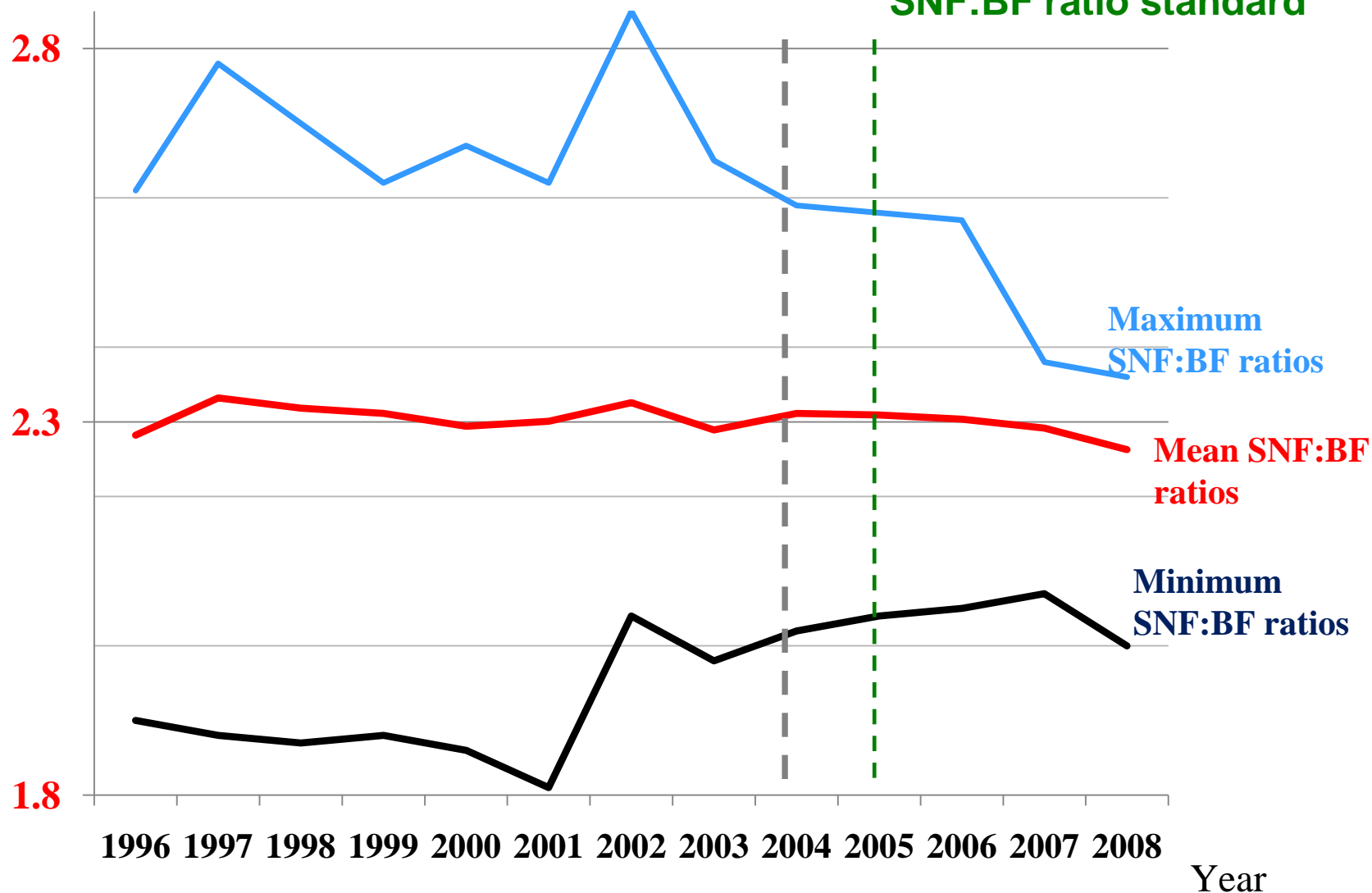
Actual SNF:BF ratios of the sample of Ontario dairy farms over the period from 2004 to 2008

Year		2004	2005	2006	2007	2008
% of farms in different categories of SNF:BF ratio						
SNF:BF Ratio categories	<2.15	3	4	2	5	8
	2.15-2.19	7	10	9	4	10
	2.20-2.24	16	11	10	15	11
	2.25-2.29	24	21	23	15	19
	2.30-2.34	19	22	31	39	46
	<2.34	69	68	75	78	94
	>2.35	31	32	25	22	6
	2.35-2.5	25	29	23	21	5
	>2.5	5	3	1	0	0

Source: ODFAP data 2004-2008

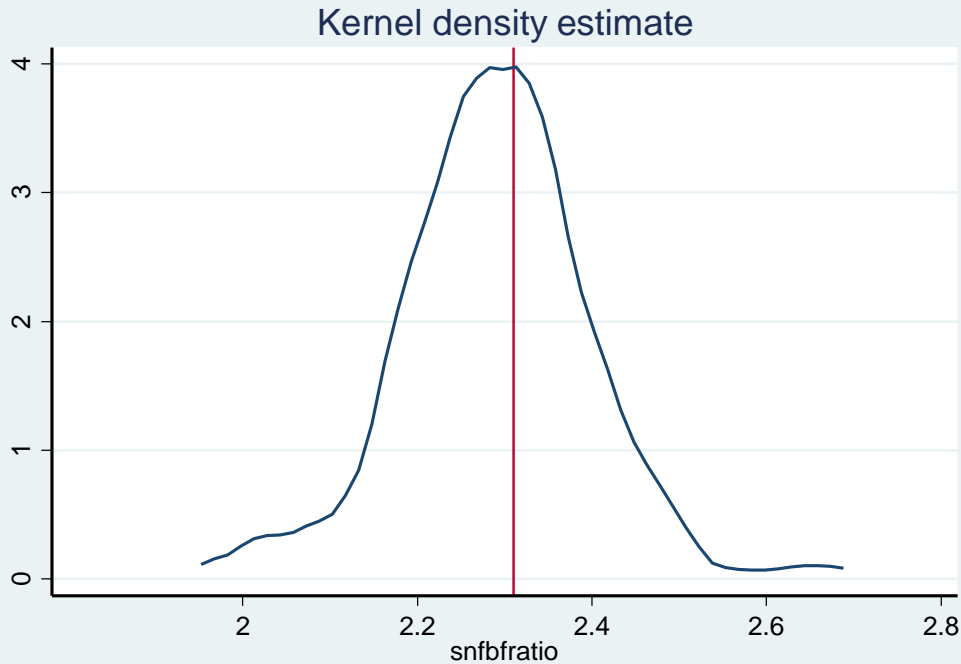
SNF:BF ratios of the sample of Ontario dairy farms over the period from 1996 to 2008

SNF:BF ratio



Source: ODFAP data 1996-2008

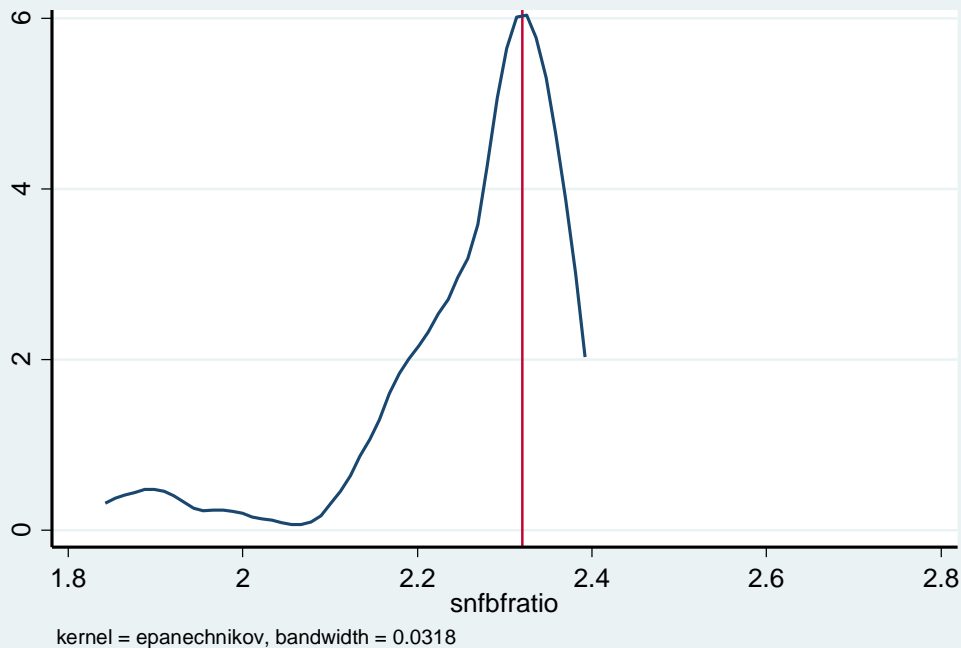
2003



Mann-Whitney-
Wilcoxon test
statistics

P-value= 0.702

2008



Kolmogorov-
Smirnov (K-S)
test statistics

P-value =0.014

Conclusions

- SNF: BF ratio standard may not have a significant impact on farm profits.
 - Restrictive vs preventive policy
- Component price shift from protein to butterfat (approx. \$3.00), increases profits
- The effectiveness of SNF to BF ratio standard in overcoming the problem of structural surplus of SMP

“ One of the challenges for the future”

(CDC, 2009)

Acknowledgements



Canadian Dairy
Commission



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Thank you