

## **THE IMPACT OF THE AUSTRALIA AND NEW ZEALAND FREE TRADE AGREEMENT ON THE BEEF INDUSTRY IN INDONESIA**

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### **ABSTRACT**

The participation of Indonesia in the ASEAN, Australia and New Zealand Free Trade Agreement (AANZFTA) may have negative effects on the beef industry in Indonesia. Every year more than 90 percent of beef imports come from Australia and New Zealand. The objectives of this study are to: (1) evaluate the impact of tariff removal on Indonesian production, consumption, domestic price and import of beef, (2) evaluate impact of free trade agreement on beef producer and consumer surpluses and, (3) propose alternative policies that can be implemented to increase domestic beef production and reduce beef imports. The removal of beef import tariffs for imports from Australia and New Zealand under AANZFTA will reduce domestic beef production, increase both beef import and domestic beef supply, leading to a reduction in domestic beef price hence, increased beef demand. AANZFTA will increase consumers' surplus and reduce producers' surplus. Reduction of beef imports in terms of imports from Australia, New Zealand, rest of the world and imported feeder cattle will result in highest producers' surplus, however domestic beef production does not increase significantly. Combination of interest rate reduction, increasing imported breeding cattle, artificial insemination technology and beef import tariffs for imports from Australia and New Zealand, is the best policy alternative to increase domestic beef production and curb beef imports. This policy combination can be implemented ahead of AANZFTA implementation. Nonetheless, Indonesia will achieve only 52 percent of beef self sufficiency with this policy in 2014.

**Key words:** tariff, consumer and producer surpluses, beef self sufficiency

### **INTRODUCTION**

Over the last two decades, there has been a surge in the number of regional trade agreements (RTAs). Many of them have been bilateral while some of them entailed several countries. Some have been local, within regions, others stretching across regions. Some have involved deep integration, going beyond the WTO, while others have been quite light and superficial (Baldwin and Low, 2009). According to WTO as of 31<sup>st</sup> July 2010, some 474 RTAs, counting goods and services separately, have been notified to WTO/GATT. Of these RTAs, Free Trade Agreements (FTAs) and partial scope arrangements account for 90 percent while the remaining 10 percent are custom unions. Slow progress in multinational trade negotiations in launching and implementing the Doha Development Round appears to have accelerated further rush to forge these regional integration agreements (Crawford and Fiorentino, 2005 and Cooper, 2011).

The agreement establishing the AANZFTA was signed in Thailand in February 2009 by Australia, New Zealand, and the ten ASEAN countries (Indonesia, Brunei, Malaysia, Philippines, Singapore, Thailand, Vietnam, Laos, Myanmar and Cambodia). AANZFTA entered into force on 1 January 2010 following notification of completion of internal requirement including ratification from eight of the parties which are Brunei, Myanmar, Malaysia, Philippines, Singapore, Vietnam, Australia and New Zealand. Subsequently, on 12 March 2010, AANZFTA entered into force for Thailand following its notification on 12 January 2010. The AANZFTA will enter into force for the three remaining ASEAN member countries (Cambodia, Laos and Indonesia) after they have notified completion of their ratification processes. The AANZFTA is the most comprehensive among the FTA agreements that ASEAN has so far concluded. Unlike others, which have separate components separately negotiated and concluded – goods, services and investments, intellectual property rights, electronic commerce, and economic cooperation are in one document<sup>1</sup>.

Generally, tariffs are eliminated on most products (except those considered sensitive) over the phase-out period, with some taking effect immediately while others scheduled to be phased out after several years. Indonesia's interest in this FTA stems from opening opportunities for its textile products exports to Australia and New Zealand markets whereas Australia and New Zealand, due to their competitive advantage, are concerned with their livestock products exports, which include milk and beef, to Indonesia. With respect to agriculture, products that are dominantly exported to Australia and New Zealand by Indonesia are coffee, cacao, rubber and palm oil. However, Indonesia competes with Malaysia and Thailand in both markets for the same products (Hutabarat *et al.*, 2009).

Among the FTAs Indonesia is involved in, AANZFTA is the first to have significant impact on the Indonesian beef industry as majority of beef imports come from Australia and New Zealand. In this forum, according to schedule of tariff commitments of Indonesia, the tariff rates for beef will be completely phased out by 2020. Currently, Indonesia imposes import tariff, presently at 5 percent on beef and 0 percent on feeder cattle, as an instrument to protect its domestic beef farmers from competing with exporting countries such as Australia and New Zealand. Approximately 30 percent of national beef demand in Indonesia is met by imported beef (as meat from Australia, New Zealand and rest of the world) and beef from imported feeder cattle (Directorate General of Livestock Services, 2010). In this study, total beef imports refer to the imported beef (meat) and beef produced from imported feeder cattle and tariff removal under AANZFTA applies only to beef (meat), since tariff rate for beef cattle is 0 percent. Although in the long run participation of Indonesia in AANZFTA may have positive impact, for instance, through technology spill-over that can improve Indonesian cattle productivity; however, in the short run, opponents of AANZFTA argue that this FTA is going to exacerbate the current condition in domestic beef industry as it will be exposed to increased competition. The consequences of AANZFTA are that, in the event of tariff free, beef import will increase from Australia and New Zealand, as major beef exporters to Indonesia<sup>2</sup>, beef supply on Indonesia market will increase, therefore causing downward pressure on domestic beef price and domestic beef production is expected to decline significantly. Statistical data indicate that export shares of Australia and New Zealand to beef imports (that is, excluding beef from imported feeder cattle) in Indonesia have increased from 27.5 and 34.3 percent in 1990 to 57.2 and 41.4 percent in 2008, respectively. Therefore possible impacts of AANZFTA need to be explored especially when Indonesia aims to achieve 90-95 percent beef self sufficiency by 2014. This research is useful for beef producers and government legislators of Indonesia to evaluate the future of beef industry under AANZFTA, especially on the welfare effects of the proposed policies, and to anticipate the 2014 beef self sufficiency program.

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<sup>1</sup> <http://aanzfta.asean.org/index.php?page=about-aanzfta>. Accessed on 14/04/2010.

<sup>2</sup> Currently, total beef (meat) import from Australia and New Zealand is already more than 70 percent of the total imported beef (meat), amounting at 45,580 tons in 2008, excluding beef from imported feeder cattle come from these countries

The overall objective of this study is to analyse the impact of AANZFTA on beef industry in Indonesia. Specifically to evaluate the impact of tariff removal on beef industry with respect to production, consumption, import and price of beef, Evaluate impact of free trade agreement on beef consumer and producer surpluses and to propose alternative policies that can be implemented to increase domestic beef production.

**INDONESIA’S BEEF SUPPLY AND DEMAND STUDIES**

Several studies concerning beef industry in Indonesia have been done. Hutabalian (2009) analysed factors affecting supply of beef. Kariyasa (2004), Priyanto (2003) and Ilham (1998) further incorporated factors affecting demand, imports and domestic price of beef and forecasting of demand and supply of beef using various techniques were done by Kariyasa (2004) and Ilham (2006). Priyanto (2003) and Ilham (1998) differentiated supply into supply from feedlots and smallholders. Simulations to evaluate the impact of beef import tariff, exchange rate and interest rate were carried out by Ilham (1998). In addition to beef import tariff, Priyanto (2003) further evaluated impact of increasing beef cattle population and artificial insemination technology on beef industry in Indonesia. The need for extended research on AANZFTA is evident due to lack of empirical studies on this specific free trade agreement. These studies have ignored the importance of differentiating beef imports according to source of origin such as New Zealand and Australia. Participation of these countries in AANZFTA may impose big challenges to Indonesian beef industry as majority of beef imports come from these countries. Therefore the effects of tariff reduction due to AANZFTA on beef industry have to be known so that Indonesia can take appropriate measures to overcome them.

**METHODOLOGY**

The model developed for this study is simultaneous equation model which consists of seven structural equations and two identity equations therefore there are nine endogenous variables. Simultaneous equation system approach yields better estimates as it is considered more appropriate in dealing with a system of commodity market in which some variables are simultaneously related (Koutsoyiannis, 1977). The model is the modification of Ilham (1998) and Priyanto (2003) models. The econometric model is as follows:

**Domestic Beef Supply**

Domestic beef supply (NBS<sub>t</sub>) is the summation of domestic beef production (DBS<sub>t</sub>) and total beef imports (BI<sub>t</sub>). The equation is as follows:

$$NBS_t = DBS_t + BI_t \dots\dots\dots(1)$$

**Domestic Beef Production**

Domestic beef production (DBS<sub>t</sub>) is determined by lagged real domestic beef price (RDBP<sub>t-1</sub>), domestic beef cattle population (BCPOP<sub>t</sub>), imported breeding cattle (IBC<sub>t</sub>), real interest rate (RIR<sub>t</sub>) which reflects the cost of borrowing from banks by farmers, lag of artificial insemination technology doses (AIT<sub>t-1</sub>) and lag of domestic beef production (DBS<sub>t-1</sub>). Artificial insemination technology improves genetic quality of cattle hence increases calving rate as a result cattle population increases. Lag of AIT is used as results of this technology are observed after a year, implying that the current domestic beef production is determined by the previous year implemented AIT dose. The equation is shown as follows:

$$DBS_t = a_0 + a_1RDBP_{t-1} + a_2BCPOP_t + a_3IBC_t + a_4RIR_t + a_5AIT_{t-1} + a_6DBS_{t-1} + U_1 \quad (2)$$

Hypothesis:  $a_1, a_2, a_3, a_5 > 0$        $a_4 < 0$        $0 < a_6 < 1$

**Total Beef Imports**

Beef imports (BI<sub>t</sub>) were differentiated by source of origin, i.e., imports from Australia (BIA<sub>t</sub>), New Zealand (BINZ<sub>t</sub>), feeder beef supply (FBS<sub>t</sub>) and the remaining as rest of the world (BROW<sub>t</sub>), to be able to study the impact of AANZFTA on Indonesia beef industry. Due to lack of data on beef supply from imported feeder cattle, it was assumed that the average slaughter weight of feeder cow is 224 kg (average live weight of 416 kg with 210/390 used as ratio of slaughter to live weight), adopted from Vanzetti *et al.* (2010). This weight was used as conversion factor to get beef production from imported feeder cattle each year by multiplying number of imported feeder cattle every year by this factor. The result was subtracted from domestic beef supply to get supply from domestically reared cattle. This is because beef self sufficiency in Indonesia is calculated based on beef production from domestically reared cattle not from imported cattle to be fattened and slaughtered for beef. Thus the equations were as follows:

$$BI_t = BIA_t + BINZ_t + FBS_t + BROW_t \dots\dots\dots(3)$$

$$BIA_t = b_0 + b_1RIBP_t + b_2RXR_t + b_3BITA_t + b_4NBD_t + b_5DBS_t + b_6BIA_{t-1} + U_2 \dots\dots\dots(4)$$

$$BINZ_t = c_0 + c_1RIBP_t + c_2RXR_t + c_3BITNZ_t + c_4NBD_t + c_5DBS_t + c_6BINZ_{t-1} + U_3 \dots\dots\dots(5)$$

$$FBS_t = IFC_t * K \dots\dots\dots(6)$$

Hypothesis:  $b_1, c_1, b_2, c_2, b_3, c_3, b_5, c_5 < 0 \quad b_4, c_4 > 0 \quad 0 < b_6, c_6 < 1$

Equations (4) and (5) indicate that beef import from Australia (BIA<sub>t</sub>) and New Zealand (BINZ<sub>t</sub>), each is determined by real import beef price (RIBP<sub>t</sub>) (average of import beef price from both countries), real exchange rate (RXR<sub>t</sub>)<sup>3</sup>, beef import tariff rate for each country (BITA<sub>t</sub> and BITNZ<sub>t</sub> for Australia and New Zealand, respectively), national beef demand (NBD<sub>t</sub>), domestic beef production (DBS<sub>t</sub>) and lag of beef import from each country (BIA<sub>t-1</sub> and BINZ<sub>t-1</sub> for Australia and New Zealand, respectively). Feeder beef supply (FBS<sub>t</sub>) (equation 6) was obtained by multiplying numbers of feeder cattle imported (IFC<sub>t</sub>) by conversion factor (K = 0.224 ton/head).

**National Beef Demand**

Demand function is determined by own-price, cross price and income elasticities of demand. The values show the percentage change in quantity demanded of a particular good to a one percent change in the price of that good, price of substitute, and in consumers' income, respectively. Thus, national beef demand (NBD<sub>t</sub>) is the function of ratio of real domestic beef price to real domestic chicken price (RDBP<sub>t</sub>/RDCP<sub>t</sub>), real gross domestic product per capita (RGDPC<sub>t</sub>) and trend (T<sub>t</sub>) which represents consumers' preference. The equation was as follows:

$$NBD_t = d_0 + d_1(RDBP_t/RDCP_t) + d_2RGDPC_t + d_3T_t + U_4 \dots\dots\dots(7)$$

Hypothesis:  $d_2, d_3 > 0 \quad d_1 < 0$

**World Beef Demand**

As Indonesia is one of the importers of beef in the world therefore world beef demand (WBD<sub>t</sub>) is the summation of Indonesian beef imports (BI<sub>t</sub>) and beef imports from the rest of the world (WBDROW<sub>t</sub>). The equation for world beef demand is as follows:

$$WBD_t = BI_t + WBDROW_t \dots\dots\dots(8)$$

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<sup>3</sup> In Rp/USD, since USD is used in trading among Indonesia, Australia and New Zealand

**Real Domestic Beef Price**

Real domestic beef price (RDBP<sub>t</sub>) is depended on difference between real import beef price and its lag (RIBP<sub>t</sub> – RIBP<sub>t-1</sub>), real domestic beef cow price (RDBCP<sub>t</sub>), domestic beef supply (NBS<sub>t</sub>) and lag of real domestic beef price (RDBP<sub>t-1</sub>). The equation is as follows:

$$RDBP_t = e_0 + e_1(RIBP_t - RIBP_{t-1}) + e_2RDBCP_t + e_3NBS_t + e_4RDBP_{t-1} + U_5 \dots\dots\dots(9)$$

Hypothesis:  $e_1, e_2 > 0 \quad e_3 < 0 \quad 0 < e_4 < 1$

**Real Import Beef Price**

Real import beef price (RIBP<sub>t</sub>) is assumed to be determined by real world beef price (RWBP<sub>t</sub>), which is United States beef import price as it is the largest importer of beef, real import beef cow (feeder) price from Australia (RIBCP<sub>t</sub>) (Indonesia imports feeder cattle predominantly from Australia) and lag of real import beef price (RIBP<sub>t-1</sub>). Real import beef price’s equation was formulated as follows:

$$RIBP_t = f_0 + f_1RWBP_t + f_2RIBCP_t + f_3RIBP_{t-1} + U_6 \dots\dots\dots(10)$$

Hypothesis:  $f_1, f_2 > 0 \quad 0 < f_3 < 1$

**Real World Beef Price**

Real world beef price (RWBP<sub>t</sub>) is assumed to be influenced by difference between world beef supply and its lag (WBS<sub>t</sub> – WBS<sub>t-1</sub>), world beef demand (WBD<sub>t</sub>) and lag of real world beef price (RWBP<sub>t-1</sub>). Thus equation for real world beef price was as thus:

$$RWBP_t = g_0 + g_1(WBS_t - WBS_{t-1}) + g_2WBD_t + g_3RWBP_{t-1} + U_7 \dots\dots\dots(11)$$

Hypothesis:  $g_1 < 0 \quad g_2 > 0 \quad 0 < g_3 < 1$

**Imported Feeder Cattle**

Feedlots prefer imported feeder cattle as compared to domestic feeder cattle because (1) they are cheaper than domestically produced feeder cattle, (2) easiness to obtain large number of feeder cattle through importing as compared to domestic procurement, and (3) time and transportation costs from Australia are cheaper than from other regions in Indonesia such as Nusa Tenggara Timur, Nusa Tenggara Barat and Sulawesi Selatan (Hadi and Ilham, 2002). Imported feeder cattle (IFC<sub>t</sub>) equation is assumed to be determined by real import beef cow (feeder) price (RIBCP<sub>t</sub>), real exchange rate (RXR<sub>t</sub>), domestic beef production (DBS<sub>t</sub>) and lag of imported feeder cattle (IFC<sub>t-1</sub>). This is shown as follows:

$$IFC_t = h_0 + h_1RIBCP_t + h_2RXR_t + h_3DBS_t + h_4IFC_{t-1} + U_8 \dots\dots\dots(12)$$

Hypothesis:  $h_1, h_2, h_3 < 0 \quad 0 < h_4 < 1$

**Estimation Method**

Twelve endogenous variables were influenced by 8 lagged endogenous variables and 17 exogenous variables. Identification was verified by calculating order and rank conditions and the model was found to be over-identified; therefore Two Stage Least Squares (2SLS) estimation method was applied. 2SLS tends to yield more robust estimates under the circumstance of the existence of model misspecification, missing of relevant variables, multicollinearity and autocorrelation error (Koutsoyiannis, 1977). Data was processed using SAS/ETS Software version 9.1.

**Producer and Consumer Surplus Analysis**

The consumer and producer surplus concepts were used to measure welfare. The consumer surplus measures the difference between what consumers are willing to pay for a good and what they actually pay. It can also be used to measure the impact on the consumer’s surplus of a change in price

of a good, *ceteris paribus*. Meanwhile, producer surplus measures the impact on the producer's welfare of a change in price of a good, *ceteris paribus*. The consumer and producer surpluses were represented as follows (Obado *et al.*, 2009) (subscript b = base value and s = policy simulation value):

1. **Change in Domestic Producer Surplus**

$$PS = DBS_b(RDBP_s - RDBP_b) + \frac{1}{2} (DBS_s - DBS_b) (RDBP_s - RDBP_b)$$

2. **Change in Domestic Consumer Surplus**

$$CS = NBD_b (RDBP_b - RDBP_s) + \frac{1}{2} (NBD_s - NBD_b) (RDBP_s - RDBP_b)$$

3. **Change in Government Revenue**

$$GR = (BIT_s * RIBP_s * BI_s) - (BIT_b * RIBP_b * BI_b)$$

4. **Net Surplus = PS + CS + GR**

It should be noted that the volume of beef imports used to calculate government revenue does not include volume of feeder beef supply because this supply is from imported feeder cattle of which are import duty free.

### **Data Type and Sources**

Data used in this study was secondary time series data from 1990 – 2008, obtained from Central Bureau of Statistics Indonesia, Directorate General of Livestock Services Indonesia, International Monetary Fund, Directorate General of Customs Indonesia and from publications and reports relevant to the study.

## **RESULTS AND DISCUSSION**

### **Model Statistics and Estimation Results**

The estimates of Indonesian beef industry model are presented in Table 1. The results show that the determination coefficients ( $R^2$ ) of six structural equations ranges between 0.67450 and 0.98722, while the remaining two are below 0.48. This means that, generally, the ability of explanatory variables in explaining variation in values of endogenous variables is quite satisfactory. However, there are parameter estimates whose signs do not conform to the hypotheses and are not significant at  $\alpha = 0.05 - 0.20$  level of significance. Two structural equations did not have autocorrelation, whereas the remaining six fell in inconclusive region ( $0.82 < DW < 1.87$  or  $2.13 < DW < 3.18$ ). Therefore there was no autocorrelation among independent variables, implying that parameter estimates are more efficient and not biased. Concerning F statistic test, the p-values were found to range between  $< .0001$  and  $0.0612$  for all equations except for domestic beef production ( $Pr > F = 0.3737$ ). This indicates that in each equation, together, the explanatory variables were able to explain variation in endogenous variables. Parameter estimation results are shown in Table 1.

All of the estimated parameters in the beef production equation have expected signs except beef cattle population. Interest rate is included to account for the cost of borrowing however it is not significant. This indicates the inability of smallholder beef farmers to access capital due to lack of collateral (Sukanata, 2008).

Beef imports were separated into imports from Australia and New Zealand so that it can be easy to observe the impact of AANZFTA on beef industry in Indonesia. On the other hand, these are the major exporters of beef to Indonesia. Most of Indonesia's beef imports come from Australia due to its proximity to Indonesia therefore there are relatively low transportation costs incurred when importing from this country. The estimates obtained for beef imports from Australia are consistent

with *a priori* expectations. As expected, beef imports from Australia are negatively related with import beef price, exchange rate, beef import tariff and domestic beef production and positively related with national beef demand.

New Zealand is the second largest exporter of beef to Indonesia. The estimates of beef imports from New Zealand suggest that the primary factors affecting beef imports from this country are real exchange rate, beef import tariff, domestic beef production and national beef demand with expected signs. Real exchange rate and domestic beef production have negative signs as expected.

**Table 1.** Results of Parameter Estimation and Statistics Tests for Beef Industry Model in Indonesia

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<b>Domestic Beef Production</b>					
$DBS_t = 384867.3 + 2.968063RDBP_{t-1} - 0.01969BCPOP_t + 3.0044568IBC_t - 1158.17RIR_t +$					
	(0.1136)	(0.2650)	(0.2044)	(0.1636)	(0.8065)
$38.04585AIT_{t-1} + 0.86668DBS_{t-1}$					
	(0.1638)	(0.7352)			
$R^2 = 0.39600$	$Pr > F = 0.3737$	$F \text{ value} = 1.20$	$DW = 2.17$		
<b>Beef Imports from Australia</b>					
$BIA_t = 26930.80 - 469.901RIBP_t - 0.01050RXR_t - 96.1892BITA_t + 0.072436NBD_t - 0.12571DBS_t$					
	(0.0728)**	(0.5341)	(0.2764)	(0.5542)	(0.1491)
					(0.0087)*
$+ 0.399544BIA_t$					
	(0.1276)				
$R^2 = 0.93187$	$Pr > F = <.0001$	$F \text{ value} = 25.07$	$DW = 2.12$		
<b>Beef Imports from New Zealand</b>					
$BINZ_t = -2791.44 + 338.6734RIBP_t - 0.00527RXR_t - 91.4101BITNZ_t + 0.055306NBD_t -$					
	(0.7041)	(0.4908)	(0.2009)	(0.3746)	(0.0397)*
$0.03693DBS_t + 0.707301BINZ_t$					
	(0.1162)	(0.0006)*			
$R^2 = 0.95219$	$Pr > F = <.0001$	$F \text{ value} = 36.52$	$DW = 1.42$		
<b>National Beef Demand</b>					
$NBD_t = 198837.1 - 12169.1(RDBP_t / RDCP_t) + 5.047602RGDPC_t + 12649.96T_t$					
	(0.0177)*	(0.6962)	(0.1434)	(0.0058)*	
$R^2 = 0.67450$	$Pr > F = 0.0010$	$F \text{ value} = 9.67$	$DW = 2.29$		
<b>Real Domestic Beef Price</b>					
$RDBP_t = 10890.23 + 1015.296(RIBP_t - RIBP_{t-1}) + 1.488288RDBCP_t - 0.01084NBS_t + 0.0496RDBP_{t-1}$					
	(0.1940)	(0.1779)	(0.0644)**	(0.6382)	(0.8755)
$R^2 = 0.47623$	$Pr > F = 0.0612$	$F \text{ value} = 2.96$	$DW = 2.27$		
<b>Real Import Beef Price</b>					
$RIBP_t = -1.93065 + 1.046104RWBP_t + 0.001755RIBCP_t + 0.413441RIBP_{t-1}$					
	(0.0396)*	(0.0264)*	(<.0001)*	(<.0001)*	
$R^2 = 0.98722$	$Pr > F = <.0001$	$F \text{ value} = 360.46$	$DW = 2.29$		
<b>Real World Beef Price</b>					
$RWBP_t = 0.029060 - 1.8E-8(WBS_t - WBS_{t-1}) + 5.20E-8WBD_t + 0.801940RWBP_{t-1}$					
	(0.9444)	(0.8231)	(0.1755)	(<.0001)*	
$R^2 = 0.79938$	$Pr > F = <.0001$	$F \text{ value} = 18.59$	$DW = 2.09$		
<b>Imported Feeder Cattle</b>					
$IFC_t = 765688.7 - 171.341RIBCP_t - 0.48451RXR_t - 0.91509DBS_t + 0.810754IFC_{t-1}$					
	(0.0001)*	(0.0021)*	(0.0001)*	(0.0280)*	(0.0001)*
$R^2 = 0.89631$	$Pr > F = <.00001$	$F \text{ value} = 28.09$	$DW = 1.69$		

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Notes: \* indicates 5 percent level of significance, \*\* indicates 10 percent level of significance, Numbers in brackets indicate t-statistics

All variables influencing national beef demand were found to conform to the theory with expected signs. Trend represents consumers' preference while real GDP per capita represents consumers' income. Chicken is a substitute of beef. The ratio of domestic beef price to domestic chicken price has negative sign as expected.

The analysis results of domestic beef price in Table 1 show that the difference between import beef price and its lag, and domestic beef cow price have positive signs as expected. The coefficient of domestic beef supply is negative as expected but it is not significantly different from zero. The coefficient of lagged real domestic beef price is positive as expected but statistically insignificant.

The estimates of all variables included in real import beef price equation conform to the theory and are statistically significant at five percent level. As expected real world beef price, real import beef cow price and lagged real import beef price are positively related with real import beef price.

In the meantime, real world beef price is affected by difference between world beef supply and its lag, world beef demand and lagged real world beef price and have expected signs. The coefficient of world beef demand is positive while difference between world beef supply and its lag is negative as expected. The coefficient of lagged real world beef price is significant at five percent indicating that lagged adjustment model is appropriate.

Feeder cattle import is mainly determined by real import beef cow price, real exchange rate, domestic beef production and lag of imported feeder cattle. Their estimates are consistent with *a priori* expectations and are statistically significant at five percent level. Real import beef cow price, real exchange rate and domestic beef production are negatively related with feeder cattle imports.

### **Evaluation of Impacts of Alternative Policies on Beef Industry**

Eleven *ex ante* policy simulations carried out in this study include:

1. Removal of import tariffs for beef imports from Australia and New Zealand
2. Interest rate reduction to five percent
3. Increasing imported breeding cattle by 30 Percent
4. Increasing artificial insemination technology in previous year by 40 percent
5. Combination of policies in policy simulations 2, 3 and 4
6. Increasing import tariffs for beef imports from Australia and New Zealand by 20 percent each
7. Combination of policies in policy simulations 5 and 6
8. Combination of policies in policy simulations 1 and 5
9. Reducing beef imports from Australia, New Zealand, rest of the world and imported feeder cattle by 90 percent each
10. Combination of policies in policy simulations 5 and 9
11. Combination of reducing real interest rate to four percent, increasing beef import tariff by 40 percent, increasing imported breeding cattle by 60 percent and increasing AI technology by 64 percent.

The impacts of these policies are summarized in Table 2. Policy simulation 1 assumes Australia and New Zealand as largest exporters of beef to Indonesia in AANZFTA. From Table 2 it can be observed that removal of beef import tariffs for beef from Australia and New Zealand will mostly increase import from New Zealand by 69.76 percent from the current import level of 5,757 tons, which translates to 4,015.9 tons per year; while imports from Australia will increase by 25.58 percent from the current import level of 8,511 tons, which translates to 2,177.4 tons annually. The eventual effect will be increase in total beef import by 10.65 percent or 6,396.7 tons. Meanwhile, increase in beef imports is coupled by corresponding increase in domestic beef supply by 6,174 tons



from the current supply of 362,144 tons or 1.7 percent. Real domestic beef price will decline by 0.3 percent, as the result of increase in domestic beef supply. Hence, national beef demand will increase by 79 tons or 0.022 percent. Domestic beef production will decline by 0.073 percent, which translates to 222 tons, in response to reduction in real domestic beef price. On the other hand, imports of feeder cattle will increase by 0.46 percent or 908 heads in response to contracted beef production in domestic market. Consequently, increase in number of imported feeder cattle will increase feeder beef supply by 203.3 tons. Although not significantly increased, increase in total beef imports by Indonesia will increase world beef demand by 6,396 tons or 0.089 percent.

As a result, due to positive influence of world beef demand towards real world beef price, real import beef price will increase by 0.07 percent. This in turn will increase real import beef price by 0.084 percent. As expected, with this policy beef consumers will experience gain in consumer surplus of about Rp 25.4 billion while beef producers will lose in producer surplus about Rp 21.2 billion (Table 3).

Through regulation of Ministry of Agriculture No. 40/Permentan/PD.400/9/2009 and Regulation of Ministry of Finance No. 131/PMK.05/2009, the government is providing livestock breeders in cattle breeding farming cattle breeding credit scheme at subsidized interest rate of five percent for maximum of six years. With this credit, the expectation is that the breeding industry and breeders will increase and develop as a result cattle population will increase and employment will be created. It is expected that it will accelerates efforts to reach beef self sufficiency in 2014. In this study interest rate was reduced to five percent (policy simulation 2). Artificial insemination (AI) is one of the efforts utilized by government to improve genetic quality of livestock and breeding cattle are imported to complement AI. During the period 1990 – 1999 semen production grew by 37 percent annually. This level was increased to 40 percent (policy simulation 4) to study impact of AI on beef production if similar conditions prevail. Number of breeding cattle imported was increased to 30 percent (policy simulation 3).

Table 2 reveals that among the three policy alternatives, AI has significant impact on increasing domestic beef production and reducing beef imports, followed by increasing imported breeding cattle. Increasing AI technology doses in previous year by 40 percent increases domestic beef production by 15,984 tons, increasing imported breeding cattle by 30 percent leads to rise in domestic beef production by 4,212 tons while reducing interest rate increases domestic beef production by only 1,803 tons. So it can be concluded that the five percent interest rate is not enough to increase domestic production significantly. The most important policies are increasing artificial insemination technology and breeding cattle. However, if government combines these three policies (policy simulation 5) domestic beef production will increase by 21,999 tons. On the other hand, domestic beef breeders believe that the current import tariff is too low to sufficient protect domestic beef industry.

Due to letter of intent that was signed between Government of Indonesia and International Monetary Fund, Indonesia can not increase its beef import tariff above five percent. However if government could increase import tariff by 20 percent (policy simulation 6) domestic beef production would increase by just 45 tons although total beef imports are reduced by 1,279.3 tons. However, if policy simulation 7 is carried out larger domestic beef production can be attained, that is, 22,043 tons. To minimise the effect of AANZFTA on domestic beef industry, policy alternatives in policy simulation 8 can be implemented since they still yield higher domestic beef production, that is, 21,776 tons.

**Table 2.** Impact of policy alternatives on beef industry in Indonesia.

Label	Unit	Mean	Policy Simulations (Units)										
			1	2	3	4	5	6	7	8	9	10	11
<b>NBS</b>	Ton	362144	6174	101	-852	-2813	-3563	-1235	-4798	2611	-52530	-31380	-8748
<b>DBS</b>	Ton	302059	-222	1803	4212	15984	21999	45	22043	21776	1604	22754	37156
<b>BI</b>	Ton	60084.7	6396.7	-1702.3	-5063.3	-18796	-25561.7	-1279.3	-26841	-19165	-54133.6	-54133.6	-45904.1
<b>BIA</b>	Ton	8511.1	2177.4	-340.2	-866.9	-3240.9	-4448.1	-435.4	-4883.6	-2270.7	-7660.0	-7660.0	-8385.6
<b>BINZ</b>	Ton	5756.6	4015.9	-164.8	-483.6	-1798.9	-2447.2	-803.2	-3250.4	1568.7	-5180.9	-5180.9	-5755.1
<b>RDBP</b>	Rp/kg	23173.3	-70.2	-1.2	9.5	31.4	39.6	14.1	53.7	-30.6	592.3	351.6	97.9
<b>NBD</b>	Ton	361227	79.0	1.0	-8.0	-24.0	-30.0	-16.0	-46.0	49.0	-615.0	-354.0	-85.0
<b>IFC</b>	Head	197675	908	-5345	-16575	-61412	-83332	-181	-83513	-82424	-177908	-177908	-141800.4
<b>FBS</b>	Ton	44279.3	203.3	-1197.3	-3712.8	-13756.3	-18666.4	-40.7	-18707.1	-18463.0	-39910.4	-39910.4	-31763.4
<b>RIBP</b>	US\$/kg	2.9776	0.0025	-0.0005	-0.0017	-0.0063	-0.0085	-0.0005	-0.0090	-0.0060	-0.0146	-0.0146	-0.0155
<b>RWBP</b>	US\$/kg	2.1300	0.0015	-0.0003	-0.0010	-0.0037	-0.0050	-0.0003	-0.0053	-0.0036	-0.009	-0.009	-0.0092
<b>WBD</b>	Ton	7184388	6396	-1703	-5064	-18796	-25562	-1280	-26841	-19165	-54134	-54134	-45904

**Table 3.** Impact of policy alternatives on beef producer surplus and consumer surplus in Indonesia

(Rp 000)

Welfare Change	1	2	3	4	5	6	7	8	9	10	11
<b>Producer Surplus</b>	-21 196 750	-363 553	2 889 568	9 735 601	12 397 117	4 259 349	16 812 423	-9 576 178	179 384 570	110 204 098	31 390 362
<b>Consumer Surplus</b>	25 355 363	433 472	-3 431 695	-11 342 905	-14 305 183	-5 093 414	-19 399 125	11 052 796	-214 136 884	-127 069 646	-35 368 284
<b>Government Revenue</b>	-22 778 085	-731 488	-1 958 178	-7 295 833	-9 973 876	2 409 364	-9 551 169	-22 778 085	-20 509 065	-20 509 065	-3 685 223
<b>Net Surplus</b>	-18 619 472	-661 568	-2 500 305	-8 903 136	-11 881 942	1 575 300	-12 137 872	-21 301 467	-55 261 379	-37 374 613	-7 663 144

In efforts to stimulate domestic beef production to achieve beef self sufficiency by 2014, the Government of Indonesia aims at reducing total beef imports to 10 percent. In Indonesia, beef self sufficiency means that 90 percent of beef demand is met by domestic beef production while the remaining 10 percent still needs to be imported to meet the demand of restaurants, hotels and high income families as domestic production cannot meet their demand in terms of quality. Total beef imports in terms of beef imports from Australia, New Zealand, rest of the world and imported feeder cattle were reduced by 90 percent each (policy simulation 9) to evaluate the impact of this policy on domestic beef production. The results show that this policy is not favorable to domestic beef industry. Although total beef imports are significantly reduced by 54,133.6 tons, domestic beef production increases by just 1,604 tons. Consequently, domestic beef supply declines by 52,530 tons leading to increase in domestic beef price by Rp 592/kg hence beef demand decline by 615 tons. To lessen the effect of this policy alternative, it can be carried out concurrently with policy alternatives in policy simulation 5 (policy simulation 10). Domestic beef production would rise by 22,754 tons while domestic beef supply declines by 31,380 tons and demand declines by 354 tons.

Policy simulation 11 was carried out as a drastic policy combination that can be implemented to drastically reduce beef imports and stimulate domestic production. Beef imports from Australia and New Zealand are almost reduced by 100 percent each, with 8,385.6 and 5,755.1 tons reductions, respectively. Imported feeder cattle are decreased by 141,800 heads which translate to 31,763.4 tons reduction in feeder beef supply. These reductions leads to 45,904.1 tons decline in total beef imports whereas domestic beef production rises by 37,156 tons. On the whole, domestic beef production is significantly increased with implementation of policy alternative in simulations 5, 7, 8, 10 and 11.

Beef producers will experience decline in producers' surplus with policy simulations 1, 2 and 8 while consumers benefit with the same policies (Table 3). Highest producers' surplus is achieved with policy simulation 9 whereas highest consumers' surplus is achieved with simulation 1. Government will gain in import tariff revenues from increasing import tariffs for beef imports from Australia and New Zealand, but will lose from other policy simulation alternatives. Indonesian society as a whole will lose in welfare from all policy alternatives except for policy alternative of increasing import tariffs for beef imports from Australia and New Zealand.

To determine level of beef self sufficiency by 2014, projections of domestic production, imports and consumption of beef from 2009 to 2014 were done using the formula to calculate average geometric rate of annual growth in Excel (Table 4). Based on statistical data, Table 4 illustrates that domestic beef production in 2008 was 264,998 tons while consumption was 438,280 tons. Under status quo conditions, domestic beef production is projected to be 374,866 tons by 2014 while consumption will be 794,969 tons.

**Table 4.** Projections of production and consumption of beef from 2009 to 2014 in Indonesia.

<b>Year</b>	<b>Domestic beef production, tons (a)</b>	<b>Beef Imports, tons (b)</b>	<b>National Beef Demand, tons (a+b=c)</b>	<b>Percent Beef Self Sufficiency [(a/c)*100]</b>
2008	264998	173282	438280	60.46
2009	283309	214419	497728	56.92
2010	301621	255555	557176	54.13
2011	319932	296692	616624	51.88
2012	338243	337829	676073	50.03
2013	356555	378966	735521	48.48
2014	374866	420103	794969	47.15
2014 <sup>a</sup>	412022	382862	794884	51.83

Table 4 further reveals that Indonesia's beef self sufficiency will tend to decrease from 60 percent in 2008 to 47 percent in 2014. This implies that 53 percent of beef demand in Indonesia will still need to be met by beef imports by 2014. Policy simulation 11 was found to yield highest domestic beef production and reduces beef imports by almost 100 percent from Australia and New Zealand. If this policy is implemented, domestic beef production would increase by 37,156 tons while beef demand would decline by 85 tons. Thus, by 2014, this policy can increase domestic beef production to 412,022 tons while beef demand could decline to 794,884 tons. Nonetheless, this policy can help Indonesia achieve only 52 percent of beef self-sufficiency (2014<sup>a</sup> figures, Table 4).

## **CONCLUSION**

Removal of beef (meat) import tariffs for imports from Australia and New Zealand under AANZFTA will increase beef imports from New Zealand and Australia. As a result, domestic beef supply will increase. Consumers will be better off as domestic beef price will be reduced due to increased domestic beef supply. Despite decline in domestic beef price, this policy will not reduce domestic beef production drastically.

ASEAN, Australia and New Zealand free trade agreement will reduce producers' surplus and increase consumers' surplus as expected. This policy will result in highest consumers' surplus. Among the policy alternatives proposed, huge producers' surplus can be attained if total beef (meat) imports in terms of imports from Australia, New Zealand, rest of the world and imported feeder cattle are banned by 90 percent each. However, producers benefit at the expense of consumers as this policy reduces domestic beef supply and increasing domestic beef price hence reducing beef demand.

In case Indonesia can be allowed to increase beef import tariff, combination of interest rate reduction to four percent, increasing number of imported breeding cattle by 60 percent, artificial insemination technology by 64 percent and beef import tariffs for imports from Australia and New Zealand by 40 percent each can be the best policy alternative that can be utilized to increase domestic beef production and discourage beef imports drastically. This policy combination can be implemented ahead of implementation of AANZFTA in Indonesia. However, this policy cannot assist Indonesia to achieve 90-95 percent beef self sufficiency but only 52 percent.

Subsequent to AANZFTA implementation, whereby beef import tariff in Indonesia will be completely phased out in 2020, government can minimize the impact of this free trade agreement by reducing interest rate, increasing number of imported breeding cattle and artificial insemination technology. All policy alternatives will result in loss in government revenue and society as a whole.

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