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Impact of Indonesia's Corn Import Restriction Policy on Feed Production Costs and Feed Price Dynamics in the Feedmill Industry

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Abstract. This study examines the impact of Indonesia's corn import ban on production costs and feed prices in the feedmill industry. Using a mixed-methods explanatory sequential design, we analyzed monthly time-series data from January 2020 to August 2025 (68 observations) obtained from the Indonesian Feedmill Association (GPMT) and Statistics Indonesia (BPS), and conducted in-depth interviews with five key industry stakeholders. Quantitative data were analyzed using multiple regression with the Cochrane-Orcutt transformation to correct for autocorrelation, log-log regression models to estimate elasticity, and descriptive statistics with volatility measures to assess seasonal patterns. Interview data were transcribed, coded using thematic analysis, and triangulated with the quantitative findings. The results show that the import ban significantly increased feed production costs, raising broiler feed costs by IDR 78.28/kg and layer feed costs by IDR 69.84/kg. Feed prices were highly inelastic to corn price changes, with elasticity coefficients of 0.030 for broiler feed and 0.064 for layer feed. The policy also increased volatility in corn availability and prices during off-harvest seasons (January–April and October–November). These findings suggest that although the policy aims to protect domestic corn farmers, it imposes substantial cost pressures on the downstream feed industry, underscoring the need for policy approaches that balance upstream and downstream interests.

Keywords: Corn import restriction, feed production cost, price elasticity, feedmill industry, Indonesia

Abstrak. Penelitian ini mengkaji dampak larangan impor jagung di Indonesia terhadap biaya produksi dan harga pakan pada industri pabrik pakan (*feed mill*). Menggunakan desain sekuensial eksplanatori metode campuran (*mixed-methods*), kami menganalisis data deret waktu (*time-series*) bulanan dari Januari 2020 hingga Agustus 2025 (68 observasi) yang diperoleh dari Gabungan Perusahaan Makanan Ternak (GPMT) dan Badan Pusat Statistik (BPS), serta melakukan wawancara mendalam dengan lima pemangku kepentingan utama dalam industri. Data kuantitatif dianalisis menggunakan regresi linier berganda dengan transformasi *Cochrane-Orcutt* untuk mengoreksi autokorelasi, model regresi log-log untuk mengestimasi elastisitas, serta statistik deskriptif dengan ukuran volatilitas untuk menilai pola musiman. Data wawancara ditranskripsi, dikodekan menggunakan analisis tematik, dan ditriangulasi dengan temuan kuantitatif. Hasil penelitian menunjukkan bahwa kebijakan larangan impor secara signifikan meningkatkan biaya produksi pakan, yaitu menaikkan biaya pakan ayam pedaging (broiler) sebesar Rp78,28/kg dan pakan ayam petelur (layer) sebesar Rp69,84/kg. Harga pakan bersifat sangat tidak elastis (inelastis) terhadap perubahan harga jagung, dengan koefisien elastisitas sebesar 0,030 untuk pakan ayam pedaging dan 0,064 untuk pakan ayam petelur. Kebijakan ini juga meningkatkan volatilitas ketersediaan dan harga jagung selama musim pascapanen (Januari–April dan Oktober–November). Temuan ini menunjukkan bahwa meskipun kebijakan tersebut bertujuan untuk melindungi petani jagung domestik, kebijakan ini memberikan tekanan biaya yang besar pada industri pakan di hilir, sehingga menegaskan perlunya pendekatan kebijakan yang menyeimbangkan kepentingan hulu dan hilir.

Kata kunci: Pembatasan impor jagung, biaya produksi pakan, elastisitas harga, industri pakan, Indonesia

Introduction

The Indonesian government restricted corn imports through Minister of Trade Regulation No. 20 of 2021 to achieve corn self-sufficiency and protect domestic farmers. The policy, however, has raised concerns about its economic impact on the downstream feed mill industry. This sector relies heavily on corn as its primary raw material, accounting for 40–55% of total feed formulations (GPMT, 2024). Consequently, such heavy dependence on domestic corn exposes the industry to seasonal production fluctuations and geographical mismatches between major production centers and consumption areas.

The downstream economic implications of this trade policy can be systematically understood by integrating protectionism theory (Sadoulet and de Janvry, 1995) and price transmission theory (Pindyck and Rubinfeld, 2018). This integrated conceptual framework posits a two-stage price transmission mechanism. In the first stage, the import ban directly disrupts the input market by reducing alternative corn supplies during off-harvest seasons. This restriction creates a domestic scarcity that drives local prices upward and accelerates stock depletion. Based on this mechanism, we hypothesize that corn price volatility increases and corn stocks at the feed mill level decline during off-harvest seasons after the implementation of the import ban (H1).

In the second stage, these escalated corn prices inevitably inflate the total production costs of feed millers. This causal link leads to the second hypothesis that domestic corn price fluctuations are positively and significantly related to feed mill production costs (H2). These higher production costs are subsequently transmitted to finished feed prices. However, the extent of this cost pass-through is highly dependent on market structure, industry competition, and corporate pricing strategies. Given the presence of other cost components and tactical margin management by firms, we further hypothesize that finished feed prices are inelastic to corn price changes (H3). Ultimately, the degree of this pass-through determines whether the economic burden of the protectionist policy falls primarily on feed millers, poultry farmers, or end consumers.

While trade protectionism and its downstream effects remain widely debated, empirical assessments of this two-stage transmission mechanism within the post-2021 Indonesian feed industry remain limited. To address this gap, this study pursues four interconnected objectives. First, it analyzes the fluctuations in the availability and price of local corn after the import ban took effect. Second, it measures the specific impact of these corn price fluctuations on feed mill production costs. Third, the study estimates the elasticity of finished feed prices with respect to corn prices. Finally, it identifies the practical risk mitigation strategies adopted by the feed mill industry to navigate these policy-driven supply pressures.

Materials and Methods

Research Design and Data Collection

This study employed a mixed-methods explanatory sequential design (Creswell & Clark, 2017), in which quantitative data collection and analysis are followed by qualitative data collection that explains and contextualizes the quantitative findings. This design allows the study to: (1) establish quantitative patterns in corn prices, production costs, and price elasticity across the study period; (2) identify statistical relationships between the policy and industry outcomes; and (3) explore the mechanisms and contextual factors behind these patterns through stakeholder perspectives. The sequential structure ensures that the qualitative inquiry responds directly to the quantitative results, strengthening the depth and validity of interpretation.

Study Period and Rationale

The study covers January 2020 to August 2025, a total of 68 monthly observations. This timeframe was selected for three reasons. First, it provides a pre-policy period (January 2020 – May 2021, 17 months) and a post-policy period (June 2021 – August 2025, 51 months), enabling before-and-after comparison while capturing seasonal patterns, which require at least 12 months of data to establish baseline cycles. Second, the 17-month pre-policy period is long enough to capture normal seasonal fluctuations in corn prices and availability without the influence of import restrictions, providing a sound counterfactual baseline. Third, the 51-month post-policy period allows analysis of both immediate impacts and medium-term adjustments as the industry adapted to the new regulatory environment. Monthly rather than annual data are essential for capturing seasonal patterns, stock dynamics, and time-lag effects in price transmission, all of which would be obscured in annual aggregates.

Quantitative Data Sources and Collection

Quantitative data were obtained from two institutional sources, selected for their authority, coverage, and reliability in the context of the Indonesian feedmill industry.

First Source: Gabungan Perusahaan Makanan Ternak (GPMT)

GPMT, the Indonesian Feedmill Association, is the primary industry association representing feedmill companies in Indonesia. Data obtained from GPMT include:

1. Monthly production costs for broiler and layer feed (IDR/kg), calculated as production-volume-weighted averages across member companies. These figures cover all direct production inputs, including raw materials, processing, labor, and overhead allocation.
2. Monthly selling prices for broiler and layer feed (IDR/kg), representing ex-factory prices at the manufacturer level, reported as weighted averages across member companies.
3. Monthly corn stocks at feedmill facilities (tons), compiled from member companies' inventory reports and representing total corn in storage at the end of each month.

GPMT collects these data through a standardized monthly reporting system in which member companies submit verified operational data, and it validates the data periodically by cross-referencing production reports and conducting site visits. With approximately 85 member companies accounting for more than 90% of Indonesia's feedmill production capacity, GPMT data are representative of the national industry (GPMT, 2024).

Second Source: Badan Pusat Statistik (BPS)

BPS, Indonesia's official statistics agency, is responsible for collecting and disseminating national economic data. Data obtained from BPS include:

1. Monthly domestic corn prices at the producer level (IDR/kg), collected through BPS's nationwide price monitoring network covering 34 provinces and 514 regencies. Producer prices represent farm-gate prices received by corn farmers, aggregated to national averages using production-volume weights.
2. Monthly corn production estimates (tons), derived from BPS's agricultural production surveys and harvest-area estimates.

BPS data collection follows established statistical protocols, with defined sampling frames, standardized instruments, and quality-control procedures. The data are publicly available through BPS publications and online databases, ensuring transparency and replicability. Table 1 describes the variables, sources, units, and number of observations.

Qualitative data were obtained from semi-structured interviews with five key informants: one from GPMT management and procurement managers from three feedmill companies of different operating scales (large, medium, and small). Interviews were conducted between June and August 2025, lasted 45–90 minutes each, and were recorded with participants' consent.

Policy Variable Definition

The central explanatory variable in the regression models is the import ban policy variable (X1), which captures the regulatory intervention introduced through Minister of Trade Regulation No. 20 of 2021. Issued by the Indonesian Ministry of Trade, the regulation restricted corn imports effective June 1, 2021, marking a fundamental shift in Indonesia's agricultural trade policy.

Table 1. Data description and sources

Variable	Description	Source	Unit	Obs.
Y1 (Broiler Feed Production Cost)	Total production cost of broiler feed per kg	GPMT	IDR/kg	68
Y2 (Layer Feed Production Cost)	Total production cost of layer feed per kg	GPMT	IDR/kg	68
Y3 (Broiler Feed Selling Price)	Selling price of broiler feed per kg	GPMT	IDR/kg	68
Y4 (Layer Feed Selling Price)	Selling price of layer feed per kg	GPMT	IDR/kg	68
X1 (Import Ban Policy)	Dummy variable: 0 before policy (Jan 2020–May 2021), 1 after policy (Jun 2021–Aug 2025)	Derived	Binary	68
X2 (Procurement Lead Time)	Average lead time for corn procurement	GPMT	Days	68
X3 (Corn Stock)	Average monthly corn stock at feedmill level	GPMT	Tons	68
X4 (Corn Price)	Average monthly domestic corn price	BPS	IDR/kg	68
X5 (Stock Coverage Ratio)	Stock-usage ratio (stock/daily usage)	Calculated	Ratio	68

Before this date, corn imports were permitted under a quota system with variable monthly allocations, although they were already subject to various non-tariff barriers and administrative requirements. The June 2021 regulation imposed a complete ban, eliminating the quota-based flexibility that had allowed feedmillers to supplement domestic supplies during production shortfalls.

To operationalize the policy for quantitative analysis, we constructed a binary dummy variable (Dt) equal to 0 before the policy's effective date and 1 thereafter: Dt = 0 for January 2020 through May 2021 (17 months) and Dt = 1 for June 2021 through August 2025 (51 months). This coding creates a structural break at the implementation point, allowing the regression model to estimate the average change in production costs attributable to the policy while controlling for other time-varying factors. The 17-month pre-policy period provides a baseline that captures normal seasonal patterns and underlying trends, while the 51-month post-policy period is long enough to assess both immediate and sustained effects, including industry adjustment.

June 2021 was chosen as the breakpoint on four grounds. First, the regulation was published and became legally effective on that date. Second, enforcement mechanisms—customs inspections and import permit denials—took effect at the same time, so the policy was binding immediately rather than phased in. Third, industry informants confirmed in interviews that customs authorities rejected all corn import applications submitted after May 31, 2021, regardless of prior approval status or existing contracts. Fourth, preliminary data analysis showed a clear break in the time series around June 2021, with corn prices shifting upward and stock levels beginning a sustained decline, providing empirical support for the coding choice.

The dummy variable specification implicitly assumes a constant policy effect over the post-policy period; that is, the model estimates a single average treatment effect rather than one that varies over time. This specification was chosen for three reasons. First, the policy remained substantively unchanged throughout the study period, with no amendments or relaxations that would justify time-varying effects. Second, the dummy variable is parsimonious and conserves degrees of freedom, which matters given the modest sample of 68 observations. Third, alternative specifications using time trends or spline functions did not significantly improve model fit in F-tests for nested models, suggesting that a constant treatment effect adequately represents the policy impact. We acknowledge, however, that the effect may evolve as the industry adapts, and we address this possibility when interpreting the results.

The policy variable also addresses potential endogeneity concerns. Because the policy was set by government decree rather than by market conditions or industry lobbying, and because its timing was exogenous to feedmill operations, the variable can be treated as exogenous in the regression models. This is supported by the fact that the regulation was announced and implemented without substantial prior consultation with the feedmill industry, whose participants had little ability to influence the decision or its timing. The policy therefore represents a genuine exogenous shock, which supports causal interpretation of the estimated coefficients.

The coding scheme follows established practice in policy evaluation research (Imbens & Wooldridge, 2009) and has been applied in previous studies of trade policy in Indonesia (Mulyani & Handayani, 2023; Widodo & Sugiyanto, 2023). Defining the policy variable and its coding explicitly keeps the analysis transparent and replicable, and allows the dummy coefficients to be interpreted in the standard way, as the average policy effect conditional on the other covariates.

Analytical Methods

Regression Model Specification

To examine the determinants of feed production costs, we used multiple regression with the Cochrane-Orcutt transformation to address autocorrelation in the time-series data. The general model was specified as:

$$Yit = \beta_0 + \beta_1 X1t + \beta_2 X2t + \beta_3 X3t + \beta_4 X4t + \beta_5 X5t + \varepsilon t$$

where: Yit = production cost for feed type i (broiler or layer) at time t; X1t = import ban policy dummy (0 before June 2021; 1 after); X2t = procurement lead time (days); X3t = corn stock (tons); X4t = corn price (IDR/kg); X5t = stock coverage ratio; β_0 = intercept; β_1–β_5 = regression coefficients; εt = error term.

The Cochrane-Orcutt transformation corrected for the first-order autocorrelation (AR1) detected in the initial estimation.

Elasticity Estimation Procedure

The price elasticity of feed prices with respect to corn prices was estimated using log-log regression models:

$$Ln(Pft) = \alpha + \beta\, Ln(Pct) + \gamma Zt + \mu t$$

where: Pft = feed price at time t; Pct = corn price at time t; Zt = vector of control variables (seasonal dummies, trend); β = elasticity coefficient (the percentage change in feed price for a 1% change in corn price); μt = error term.

This specification yields the elasticity coefficient (β) directly. Both contemporaneous elasticity and distributed-lag elasticities (1–3 months) were estimated to capture temporal adjustment, using an Almon polynomial distributed lag (PDL) with a 3-month lag length and a second-degree polynomial, selected by Akaike Information Criterion (AIC) comparison.

Diagnostic Tests

To ensure model validity, we conducted the following diagnostic tests:

1. Variance Inflation Factor (VIF), to detect multicollinearity among independent variables;
2. Durbin-Watson statistic, to test for autocorrelation in residuals;
3. Breusch-Pagan test, to detect heteroscedasticity; and
4. Ramsey RESET test, to assess model specification.

Regression Model Specification

Interview data were transcribed verbatim and analyzed using thematic analysis, following Braun and Clarke's (2006) six-step framework: (1) familiarization with the data, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the report. Coding was performed in NVivo 12. Themes were identified through iterative reading and constant comparison.

Results and Discussion

Descriptive Analysis of Corn Availability and Price Fluctuations

The corn import ban under Minister of Trade Regulation No. 20 of 2021 has substantially altered the dynamics of Indonesia's corn supply chain. This section analyzes corn availability and price fluctuations over 2020–2025, covering both the pre- and post-policy periods. Understanding these patterns is necessary for assessing the policy's effect on the industry's raw material security.

Two patterns stand out. First, the post-policy period (2022–2025) shows a 31.3% price increase over the pre-policy period (2020–2021). This is consistent with Sutarto et al. (2020), who predicted that import restrictions would raise domestic prices by reducing market competition. Second, seasonal patterns became more pronounced after implementation: the January–March and October–December periods consistently showed higher prices, with average premiums of 12.4% and 14.8%, respectively, over harvest seasons. This seasonal amplification supports H1.

Corn Stock and Availability Dynamics

The stock data point to growing supply chain instability after the import ban. As Table 3 shows, inventories declined, and stock turnover accelerated, indicating increasing vulnerability in the industry's raw material supply.

Four trends emerge from the post-policy data. Inventory depletion: average monthly corn stocks fell 45.2%, from 1,856,742 tons in 2020–2021 to 1,017,492 tons in 2024–2025, substantially reducing the industry's buffer against supply disruptions and seasonal fluctuations. Faster stock turnover: turnover declined from 18.5 to 10.8 days, a 41.6% reduction in inventory coverage. A declining stock-usage ratio: the ratio fell from 1.25 to 0.72; a value below 1.0 indicates that current stocks cannot cover operational requirements during supply disruptions, leaving the industry with minimal safety margins. Longer procurement lead times: lead times rose from 7.2 days in 2020–2021 to 12.5 days in 2024–2025, a 73.6% increase, reflecting growing difficulty in sourcing adequate corn supplies. Together, these trends indicate an increasingly strained supply chain in which feedmill companies operate with minimal buffers and are highly exposed to disruptions in domestic corn production or distribution.

Comparative Analysis with Previous Studies

Our findings corroborate several aspects of previous research while adding new dimensions. First, the observed price increase (31.3%) exceeds Sutarto et al.'s (2020) projection of 15–20%, suggesting either a stronger market response or insufficient expansion of domestic production capacity.

Table 2. Monthly corn price and stock fluctuations (2020–2025)

Year	Jan–Mar Average (IDR/kg)	Apr–Jun Average (IDR/kg)	Jul–Sep Average (IDR/kg)	Oct–Dec Average (IDR/kg)	Annual Average (IDR/kg)
2020	4,125	3,890	4,235	4,450	4,175
2021	4,380	4,120	4,480	4,720	4,425
2022	5,230	4,780	5,450	5,890	5,338
2023	5,650	5,120	5,780	6,150	5,675
2024	5,920	5,350	6,050	6,480	5,950
2025*	6,150	5,580	6,280	–	5,985

*Data through August 2025

Table 3. Corn stock fluctuations at feed mill level (2020–2025)

Period	Average Monthly Stock (tons)	Stock Turnover (days)	Stock-Usage Ratio	Procurement Lead Time (days)
2020–2021	1,856,742	18.5	1.25	7.2
2022–2023	1,452,389	14.2	0.98	9.8
2024–2025	1,017,492	10.8	0.72	12.5

Second, stock depletion proceeded faster than anticipated in Nugroho and Sari's (2019) supply chain risk assessment, indicating potential systemic vulnerabilities. Third, persistent regional price disparities point to unresolved logistical constraints, consistent with the infrastructure bottlenecks identified by Prasetyo and Hidayat (2021).

Impact of Corn Price on Feed Production Costs

Feed production costs depend heavily on raw material inputs, with corn accounting for 40–55% of total production costs in poultry feed formulations (GPMT, 2024). This section analyzes how movements in domestic corn prices after the import ban affected feed production costs.

Direct Cost Impact Analysis

Corn cost increases contributed 59.6% of the total production cost increase for broiler feed and 61.0% for layer feed, confirming corn's central role in the feed cost structure and supporting H2. In the post-policy period, every 10% increase in corn prices raised total production costs by 4.1% for broiler feed and 4.0% for layer feed, in line with Prasetyo and Hidayat's (2021) estimate of a 3.8–4.2% cost pass-through rate in Indonesia's feed industry.

Regression Analysis of Cost Drivers

Diagnostic test results: VIF values for all variables were below the threshold of 5 (ranging from 2.14 to 4.52), indicating no severe multicollinearity. The Durbin-Watson statistics (1.892 and 1.876) were close to 2, indicating no significant autocorrelation after the Cochrane-Orcutt transformation. The Breusch-Pagan test (χ^2 = 2.143; $p>0.05$) indicated homoscedasticity, and the Ramsey RESET test (F = 1.245; $p>0.05$) showed no evidence of misspecification, supporting the chosen functional form.

The regression results support H2. The import ban variable (X1) is statistically significant for both feed types ($p<0.01$ for broiler; $p<0.05$ for layer), increasing production costs by IDR 78.28/kg for broiler feed and IDR 69.84/kg for layer feed. Corn price (X4) is significant only for layer feed, but its coefficient is positive for both feed types, consistent with the expected direction of the relationship.

Model explanatory power: The adjusted R^2 values of 0.200 and 0.197 indicate that the model explains about 20% of the variation in feed production costs. Although roughly 80% of the variation remains unexplained, this is common in time-series studies of agricultural markets, where prices reflect many external factors, including global commodity markets, weather, exchange rates, and other macroeconomic variables.

The significant F-statistics ($p<0.05$) confirm the model's overall explanatory value, and the significant policy coefficients remain informative despite the limited fit. Future research incorporating variables such as fuel prices, exchange rates, and global corn prices may improve model performance.

Table 4. Direct cost impact of corn price increases on feed production

Cost Component	Pre-Policy (2020–2021) (IDR/kg)	Post-Policy (2022–2025) (IDR/kg)	Change (IDR/kg)	% Increase
Broiler Feed				
Corn cost/kg feed	1,855	2,298	+443	23.9%
Other raw materials	2,150	2,380	+230	10.7%
Processing cost	850	920	+70	8.2%
Total production cost	4,855	5,598	+743	15.3%
Layer Feed				
Corn cost/kg feed	1,730	2,145	+415	24.0%
Other raw materials	1,980	2,180	+200	10.1%
Processing cost	790	855	+65	8.2%
Total production cost	4,500	5,180	+680	15.1%

Table 5. Regression results for feed production cost determinants

Variable	Broiler Feed Coefficient	t-statistic	VIF	Layer Feed Coefficient	t-statistic	VIF
Constant	577.088**	23.409	–	455.313**	17.544	–
Import Ban Policy (X1)	78.280**	4.036	2.14	69.841*	3.239	2.14
Corn Price (X4)	0.038	1.381	3.87	0.072*	2.338	3.87
Corn Stock (X3)	0.000	-1.468	4.52	0.000	-0.979	4.52
Procurement Lead Time (X2)	0.000086	1.084	3.21	0.0000085	0.096	3.21
Stock Coverage (X5)	4.656	1.477	3.45	2.117	0.606	3.45
Adjusted R^2	0.200			0.197		
F-value	4.248*			4.184*		
Durbin-Watson	1.892			1.876		
Breusch-Pagan χ^2	2.143			2.567		
Ramsey RESET F	1.245			1.387		

Note: **p<0.01; *p<0.05; VIF = Variance Inflation Factor

Table 6. Price elasticity of feed to corn price changes (Log-log regression)

Feed Type	Elasticity Coefficient	Standard Error	t-statistic	R^2	95% CI	Interpretation
Broiler Feed	0.030	0.008	3.750**	0.845	[0.014, 0.046]	Highly inelastic
Layer Feed	0.064	0.012	5.333**	0.822	[0.040, 0.088]	Highly inelastic

Note: **p<0.01; CI = Confidence Interval

Price Elasticity Analysis

Price elasticity measures how feed prices respond to changes in corn prices, offering insight into market dynamics and cost transmission in the feedmill industry. Elasticity estimation: Coefficients were estimated with the log-log regressions specified in the Methods section; the log-log form yields the elasticity directly as the estimated β and assumes a constant elasticity between feed and corn prices. Point elasticities computed at sample means ($e = (\Delta P_f/P_f)/(\Delta P_c/P_c)$) produced nearly identical results (0.031 and 0.065, respectively), confirming the robustness of the estimates.

Both feed types are highly inelastic to corn price changes, with coefficients significantly below 1 ($p<0.01$). This strongly supports H3 and indicates that feed manufacturers absorb much of any corn price increase. The difference between broiler feed (0.030) and layer feed (0.064) suggests differing market structures and competitive pressures. A 10% increase in corn prices raises broiler feed prices by only 0.30% and layer feed prices by 0.64%, implying that manufacturers absorb roughly 94–97% of corn price increases.

Why elasticity is so low: Although the values appear unusually small, several factors explain them: (1) intense price competition in the feed industry, which limits manufacturers' ability to pass on cost increases; (2) price sensitivity among poultry farmers, who operate on thin margins and can switch suppliers; (3) long-term supply contracts that stabilize prices; and (4) strategic pricing, whereby companies absorb cost increases to retain customers. Similar results have been reported in other developing-country settings, where imperfect competition and market structure limit price transmission (Meyer & von Cramon-Taubadel, 2017).

Cost Pass-Through Mechanisms

Although total production costs rose by an average of 15.2%, selling prices rose by only 4.7%, implying a 69% absorption rate by feed manufacturers. This substantial absorption reflects strong market competition and the price sensitivity of downstream poultry farmers.

Table 7. Cost pass-through analysis by feed type

Cost Component	Broiler Feed Pass-Through Rate	Layer Feed Pass-Through Rate	Industry Average
Direct corn cost	23.9%	24.0%	23.95%
Other raw materials	10.7%	10.1%	10.4%
Processing costs	8.2%	8.2%	8.2%
Total cost pass-through	15.3%	15.1%	15.2%
Price pass-through	3.0%	6.4%	4.7%
Absorption rate	80.4%	57.6%	69.0%

Table 8. Time-lag analysis of price transmission (Distributed lag model)

Time Lag	Broiler Feed Elasticity	Layer Feed Elasticity	Significance Level
Immediate (t=0)	0.030	0.064	p<0.01
One month (t=1)	0.045	0.082	p<0.05
Two months (t=2)	0.052	0.091	p<0.05
Three months (t=3)	0.048	0.085	NS

Note: Distributed lag model estimated using Almon polynomial distributed lag (PDL) with a 3-month lag length. NS = not significant (p>0.05)

The difference in absorption between broiler feed (80.4%) and layer feed (57.6%) suggests differing competitive dynamics and customer price sensitivity across market segments.

Time-Lag Effects in Price Transmission

Price transmission elasticity rises gradually, peaks at two months, and then declines. This pattern indicates that feed manufacturers adjust prices progressively rather than immediately, most likely because of contractual obligations, competition, and pricing strategy. The distributed-lag model shows that the full effect of corn price changes on feed prices is realized over about two months. The asymmetric response—slower adjustment when corn prices fall than when they rise—is consistent with Meyer and von Cramon-Taubadel's (2017) findings on asymmetric price transmission in agricultural markets.

Why Protectionist Policies Increase Market Volatility

Although protectionist policies aim to stabilize domestic markets, the findings show that they can instead increase volatility. The import ban removed imports as a buffer against production shortfalls, producing larger price swings during off-harvest seasons. This reflects the tension between protectionism and market efficiency: shielding domestic producers from international competition can create artificial scarcity and price distortions that harm downstream industries. The 31.3% price increase and 45.2% stock decline observed in this study illustrate this unintended consequence.

Supply Chain Disruptions and Feed Costs

The study also shows how supply disruptions cascade through the value chain. Longer procurement lead times, declining buffer stocks, and faster stock turnover have raised operational costs beyond the direct effect of corn prices; the 28% increase in inventory management costs and the 35% increase in procurement staff time reflect these secondary effects. These results extend previous work (Christopher, 2016; Heizer & Render, 2017) by quantifying the efficiency losses associated with import restrictions in a developing-country context.

Policy Trade-offs: Farmers vs. Feed Manufacturers

A basic policy tension emerges between protecting upstream farmers and sustaining the downstream industry. The policy raised the prices farmers receive, addressing farmer welfare concerns, but it also imposed substantial cost pressures on feed manufacturers that ultimately affect poultry farmers and consumers. The 69% absorption rate shows that manufacturers currently bear most of the burden, which is unlikely to be sustainable over the long term. This trade-off raises a central design question: can farmer protection be achieved without imposing high costs on downstream industries?

Implications for the National Poultry Industry

The findings carry broader implications for Indonesia's poultry industry, a major source of animal protein and employment. Feed accounts for 60–70% of poultry production costs, so higher feed costs directly affect poultry prices and farmer profitability. The inelastic price responses suggest that poultry farmers are squeezed between rising input costs and a limited ability to pass costs on to consumers, with potential consequences for production, food security, and the competitiveness of Indonesia's poultry sector.

1. Flexible import quotas during off-harvest periods
   The seasonal price premiums of 12.4–14.8% during off-harvest seasons suggest that targeted import relaxations in these periods could stabilize prices without undermining farmer protection objectives.
2. A strategic corn reserve
   The decline in the stock-usage ratio from 1.25 to 0.72 indicates insufficient buffer capacity. A national strategic corn reserve could stabilize supply during disruptions and reduce the need for emergency imports while maintaining farmer price support.
3. Stronger contract farming arrangements
   The qualitative findings indicate that vertical integration has worked for large companies but remains out of reach for smaller firms. Policy support for contract farming could improve supply chain coordination without requiring full integration.
4. Transportation and logistics support
   Persistent regional price disparities point to logistical bottlenecks. Subsidies or investment in transport infrastructure could narrow geographic price differences and improve market integration.
5. A national corn inventory information system
   Companies report operating with limited information about national corn stocks and production forecasts. A transparent, real-time information system could reduce uncertainty and improve procurement planning.
6. Gradual policy adjustment
   Given the disruption caused by the sudden import ban, a phased approach to import restrictions, with clear communication, would allow the industry to adjust and would reduce volatility.

Conclusions

This study demonstrates that while the corn import ban is designed to protect domestic agriculture, it creates a challenging economic dilemma by generating substantial, unintended cost pressures on Indonesia’s downstream feed mill industry. First, the restriction on trade directly destabilizes the input market, particularly during off-harvest seasons. Without the buffer of imports, the domestic market experiences heightened price volatility and structural supply deficits that reduce raw material stocks, shorten inventory turnover windows, and prolong procurement cycles. Second, local corn price fluctuations serve as the primary catalyst for escalating feed production costs, creating a positive transmission mechanism that directly inflates manufacturing expenditures for both broiler and layer feed formulations. Third, despite bearing these steep production cost increases, feedmillers possess limited capacity to pass these expenses onto finished product prices. Due to intense market competition and high price sensitivity among poultry farmers, finished feed prices remain highly inelastic, forcing manufacturers to absorb the majority of the cost shocks, which leads to severe margin compression. To survive these policy-driven pressures, the industry has shifted toward strategic adaptation—notably through vertical integration, raw material diversification, and seasonal inventory hedging—though these mechanisms inherently raise operational and logistics expenses.

Despite these insights, this study possesses certain limitations that open avenues for future research. The moderate explanatory power of the production cost models suggests that unobserved macroeconomic variables are also at play; thus, future studies should expand this framework by incorporating factors such as fuel prices, exchange rate fluctuations, global commodity markets, and climate conditions. Additionally, while the qualitative insights from key stakeholders provided deep contextual depth, broader surveys across a larger sample of feed mill enterprises would enhance the generalizability of the findings. Finally, to achieve a truly holistic policy evaluation, future empirical work must expand beyond the downstream sector to measure the actual welfare gains achieved by domestic corn farmers, balancing them against the economic losses documented in the downstream industry.

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