

Land Valuation, Policy Literacy, and Livelihoods in Peri-Urban Poultry Systems: Evidence from Indonesia

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Abstract. Rapid urban encroachment is compressing Indonesia's peri-urban farmland, raising uncertainty over siting, buffers, and rights an urgent threat to small and medium poultry producers and affordable protein access. We test whether producer perceptions of land valuation and their policy literacy jointly explain livelihood improvement in a peri-urban corridor of Malang Regency (East Java). A cross-sectional survey of 207 broiler producers was analyzed using PLS-SEM (SmartPLS) with three reflective constructs: land valuation, policy literacy, and livelihood improvement. The model explains 64.0% of variance in policy literacy and 53.3% in livelihood improvement. Land valuation is strongly and positively associated with policy literacy ($\beta=0.800$, $p<0.001$) and significantly associated with livelihood improvement ($\beta = 0.302$, $p = 0.019$). The policy literacy–livelihood path is positive but not statistically significant ($\beta = 0.242$, $p = 0.065$), yielding a non-significant indirect effect ($\beta = 0.193$, $p = 0.067$). Findings indicate that credible land signals value, transferability, and rights clarity primarily drive livelihood gains under peri-urban pressure, while policy literacy is presently complementary. Practical implications-prioritize transparent, locally legible land-valuation and rights services, and pair policy-literacy training with resource-enabling instruments (eco-financed biosecurity, streamlined permits) to convert knowledge into action and stabilize protein supply.

Keywords: peri-urban agriculture, land valuation, policy literacy, poultry systems, PLS-SEM.

1 Introduction

Urbanization is redrawing the rural–urban interface across Southeast Asia at unprecedented speed, compressing the space available for food production while amplifying governance demands on land, biosecurity, and market regulation. Peri-urban corridors once buffers of mixed farming have become hotspots of land speculation and fragmented jurisdiction, where agricultural parcels are rapidly subdivided, converted, or revalued without commensurate

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policy capacity to safeguard livelihoods and local protein supplies. Globally, livestock remains pivotal for rural incomes and nutrition, yet disease risks, price volatility, and thin policy support render these gains precarious for small and medium producers. Livelihoods scholarship has long emphasized that household well-being hinges on the interaction between assets, institutions, and shocks; recent reformulations of the Sustainable Livelihoods Framework (SLF) further foreground governance quality and policy mixes as decisive conversion factors that translate assets into outcomes. In middle-income settings, poultry has become the fastest-growing meat and is projected to account for the largest share of global meat protein consumption by the 2030s, this trajectory is especially salient in urbanizing countries where affordability and short production cycles make broilers a strategic lever for equitable protein access [1]. Yet the same peri-urbanization that channels labor and capital toward cities also erodes farmland, raises transaction costs for compliance, and heightens uncertainty about land rights and land values dampening incentives to invest in biosecurity and scale. Together, these dynamics make it urgent to interrogate how land valuation and policy literacy interact to shape livelihood improvement in peri-urban agrarian frontiers.

Indonesia exemplifies these pressures. In East Java peri-urban Malang corridor, built-up area has expanded sharply over the past two decades, with recent spatial analyses documenting a jump from approximately 1,826 ha in 2004 to roughly 8,017 ha in 2024 (about 4% to 15.4% of the landscape), driven by residential estates, education hubs, and commercial zones. Multiple studies across Malang's western and peripheral districts reveal sprawl typologies that systematically displace agriculture toward marginal parcels, fragment holdings, and complicate zoning enforcement. East-Java-wide evidence further shows that peri-urban development accelerates agricultural land conversion and degrades water quality, with measurable disparities in basic services emerging between rural and peri-urban communities [2]. Historical and comparative work across rapidly growing regencies confirms the pattern: conversion of prime plots to housing can exceed 4-5% annually, reshaping settlement morphology and crowding out productive uses. At the same time, Indonesia's poultry sector dominated by broilers must meet surging demand amid import dependence for breeding stock and feed, uneven value-chain governance, and episodic shocks from animal disease and market cycles. The result is a blunt dilemma for peri-urban producers: land markets and regulatory complexity move faster than the capabilities farmers need to interpret, comply with, and strategically leverage policy what we term policy literacy so that land remains an asset rather than a liability for livelihood improvement.

A pragmatic pathway through this dilemma is to couple land-governance tools with targeted capability building. First, credible land information and valuation embedded in transparent, locally legible processes reduce investment risk and align expectations among farmers, developers, and regulators. International evidence shows that tenure security and predictable transferability of rights spur land-related investment and long-horizon management, while country diagnostics such as the Land Governance Assessment Framework (LGAF) offer structured entry points to benchmark valuation practices, public land management, and dispute resolution [2]. Second, strengthening front-line policy capacity through farmer-facing policy-literacy modules that demystify zoning, licensing, environmental permits, and biosecurity obligations can lower compliance costs, improve bargaining positions, and encourage adoption of risk-reducing practices in poultry systems. Third, aligning these micro-capabilities with meso-level integrative capacity across agencies so that spatial planning, animal health, and agri-food market regulation speak to one another can mitigate the patchwork effects of fragmented decision-making that often characterize peri-urban jurisdictions [3], [4]. Together, these interventions can stabilize broiler production in land-scarce settings, protect local protein access, and convert rising land values from a threat into a co-financing opportunity for resilience investments.

Prior work provides critical building blocks but leaves important questions unresolved. Land-use scholarship documents the tempo and drivers of peri-urban agricultural conversion in Indonesia and beyond, with robust evidence on spatial trajectories, institutional determinants, and socio-ecological impacts. Development economics and rural studies link tenure security, valuation, and governance quality to household investment and productivity, including for livestock. Food-systems and animal-health literature shows how disease control, standards, and value-chain coordination condition livelihood outcomes for smallholders and medium growers in poultry sectors. At the same time, policy-studies scholarship has matured conceptual and measurement frameworks for policy capacity analytical, operational, and political across individual, organizational, and systemic levels, with implications for the design of implementable policy mixes. Market-oriented analyses of Indonesia broiler chain highlight sensitivity to input costs (feed, breeding stock), contractual structures, and the need for standards that remain attainable for smaller producers. Finally, updated SLF perspectives synthesize these threads in a governance-aware livelihoods lens, urging closer attention to institutions that mediate how assets translate into poverty reduction [5].

Despite these advances, three research gaps persist. First, there is limited causal, field-based evidence on how perceived land valuation in peri-urban settings shapes producers' policy literacy (comprehension of land-use rules, permits, and biosecurity obligations) and, in turn, livelihood improvement. Most studies treat valuation and capacity as separate analytical strands rather than interacting drivers tested within a single empirical model. Second, Indonesia-specific studies rarely connect peri-urban land dynamics to household-level protein access mechanisms, even though broilers are a primary, affordable protein whose continuity depends on land and regulatory clarity. Third, although policy studies articulate multi-level integrative capacity, operationalization remains limited for the agriculture–animal health–spatial planning interfaces typical of peri-urban jurisdictions, where overlapping mandates are the norm. Accordingly, this study aims to: (1) test the pathways linking land valuation and policy literacy to livelihood improvement among peri-urban poultry producers; (2) assess whether policy literacy mediates the relationship between land valuation and livelihood outcomes; and (3) distill implications for protecting local protein access through governance instruments that are both legible to producers and coordinated across agencies.

This paper advances theory and practice in three ways. Conceptually, it integrates the SLF asset institution nexus with policy-capacity scholarship to model policy literacy as a household-level capability that conditions how perceived land value translates into investment and livelihood outcomes in peri-urban agrarian frontiers. Empirically, it provides Indonesia-specific evidence from a peri-urban corridor undergoing rapid conversion, using a structural model that jointly estimates direct and mediated effects an approach rarely applied to land, governance, livelihood questions in livestock systems. Practically, it offers a policy toolkit that couples transparent land valuation and tenure diagnostics (LGAFF-style benchmarks) with farmer-facing policy-literacy modules and inter-agency integrative capacity, thereby aligning spatial planning, animal health, and market regulation to stabilize broiler production and safeguard equitable protein access.

2 Materials and methods

2.1 Research Design and Approach

We employed a cross-sectional, explanatory design to test a mediation model linking Land Valuation (LV) and Policy Literacy (PLit) to Livelihood Improvement (LI) among peri-urban

poultry producers. A variance-based PLS-SEM approach was selected because it prioritizes prediction, accommodates complex models with reflective indicators under potential non-normality, and is well-suited to moderate samples from field surveys in developing-country contexts; reporting follows contemporary guidance on measurement and structural assessment [6].

2.2 Study Site and Participants / Sampling Procedure

The study took place in four peri-urban sub-districts of Malang Regency, East Java; Turen, Gondanglegi, Wajak, and Pagelaran which were purposively selected based on documented urban expansion and ongoing agricultural conversion. These sub-districts represent typical peri-urban dynamics in Indonesia: mixed land-use transitions, fragmented jurisdiction, and pressure on smallholder livestock systems. From local registries and producer groups, we identified 285 eligible broiler producers. After initial contact, 235 agreed to participate (response rate = 82.5%). During data cleaning, 28 responses were excluded due to incomplete or inconsistent patterns, resulting in 207 valid responses (attrition rate = 11.9%). The final sample exceeds the recommended 10-times rule for PLS-SEM and provides adequate power for medium-effect detection [7].

2.3 Variables and Indicators

Three reflective latent variables were operationalized from established literatures and locally adapted: LV (perceptions of market value, expected appreciation, land liquidity, and clarity/documentation of rights), PLit (understanding of zoning, permits/licensing, environmental compliance thresholds, and biosecurity obligations), and LI (perceived improvements in income stability, shock management, productive investment, and overall well-being). Items used a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree) and were adapted from land-governance diagnostics (LGAF), policy-capacity scholarship, food/policy literacy, and livelihoods frameworks with back-translation to ensure conceptual equivalence [8].

2.4 Data Collection Procedures

Trained enumerators conducted face-to-face interviews using a structured questionnaire after a two-day protocol and ethics briefing; a pilot (20) respondents outside sampled villages informed minor wording refinements and timing. To reduce common-method variance, we ensured proximal/psychological separation of predictors and outcomes, varied stems/anchors, assured anonymity, and randomized item blocks. Daily digitization involved range/logic checks; supervisors performed spot checks and 10% call-backs to verify authenticity. Missingness per item was <5% and addressed with mean replacement consistent with reflective measurement and SmartPLS defaults [9].

2.5 Research Instruments

The instrument comprised: eligibility/consent; respondent and enterprise profile (age, education, experience, production scale, contract/independent status, landholding characteristics); LV and PLit sections; and LI outcomes. Content validity was established via expert review (land governance, animal health/biosecurity, rural livelihoods), ensuring coverage of zoning/licensing, environmental thresholds, and biosecurity practices while

maintaining local legibility cognitive debriefs during the pilot confirmed clarity and response variability.

2.6 Data Analysis

Analyses were run in SmartPLS v4 with bootstrapping (5,000 resamples, two-tailed $\alpha = .05$). For the measurement model (reflective), we targeted outer loadings ≥ 0.708 (retaining 0.40–0.70 only when theoretically essential and AVE/CR acceptable), internal consistency (Cronbach's α , $CR \geq 0.70$), convergent validity (AVE ≥ 0.50), discriminant validity (HTMT < 0.85 – 0.90 with bootstrapped CIs), and collinearity (inner/outer VIF < 3.3). For the structural model, we reported path coefficients (β , p , CIs), R^2 , effect sizes (f^2), predictive relevance (Q^2 via blindfolding), and out-of-sample prediction (PLSpredict vs linear benchmarks) while testing mediation for LV to PLit to LI using bias-corrected indirect effects [10].

3 Results and discussion

3.1 Descriptive Statistics

The analytic sample comprised 207 peri-urban broiler producers drawn from four sub-districts in Malang Regency (Turen, Wajak, Gondanglegi, and Pagelaran). Respondents were predominantly male (82.6%), with a mean age of 42.3 years ($SD = 9.5$) and an average of 14.7 years of farming experience ($SD = 7.8$). Most producers operated on leased land (73.5%). A majority (64%) reported direct exposure to urban expansion pressures that reduced production capacity, narrowed biosecurity buffers, and heightened environmental stress in surrounding parcels. Construct means indicated moderately high perceptions for both land valuation and policy literacy (3.87–4.21 on a five-point scale). Perceptions were strongest for land's economic value ($M = 4.21$) and spatial positioning ($M = 4.09$), while participation in formal valuation procedures was lower ($M = 3.87$). Within policy literacy, respondents reported greater familiarity with environmental regulations ($M = 4.12$) and zoning ($M = 4.07$) than with biosecurity standards ($M = 3.94$). Livelihood improvement items clustered between 3.89 and 4.03, indicating perceived gains in income stability, shock management, and investment.

Table 1. Respondent profile (n = 207).

Characteristic	Value
Age (years)	42.3 (SD = 9.5)
Farming experience (years)	14.7 (SD = 7.8)
Gender	Male: 82.6%
Education (highest attained)	Primary: 18.8% Secondary: 58.5% Tertiary: 22.7%
Land tenure	Owned: 26.5% Leased: 73.5%
Production scale (birds/cycle)	< 1,000: 34.3% 1,000–5,000: 52.2% > 5,000: 13.5%
Exposed to urban expansion	Yes: 64.0% No: 36.0%
Sub-district distribution	Turen: 28.0% Gondanglegi: 26.6% Wajak: 24.2% Pagelaran: 21.2%

Note: Data collected from four peri-urban sub-districts in Malang Regency, East Java, Indonesia

3.2 Measurement Model Assessment

Reliability and validity diagnostics supported the quality of all reflective constructs. Internal consistency was satisfactory for Land Valuation (Cronbach’s $\alpha = 0.701$; CR = 0.774), Policy Literacy ($\alpha = 0.755$; CR = 0.809), and Livelihood Improvement ($\alpha = 0.709$; CR = 0.842). Convergent validity was evidenced by Average Variance Extracted (AVE) values at or above the recommended threshold: Land Valuation = 0.689, Policy Literacy = 0.794, and Livelihood Improvement = 0.797. Standardized outer loadings ranged from 0.646 to 0.942, with the economic-value indicator for Land Valuation loading most strongly. Discriminant validity (HTMT) and collinearity checks (VIF) met conventional criteria. Collectively, these results indicate that the reflective blocks are reliable and adequately capture their intended constructs.

3.3 Structural Model and Hypothesis Testing

The structural model demonstrated substantive explanatory power, accounting for 64.0% of the variance in Policy Literacy and 53.3% in Livelihood Improvement.

Table 2. Hypothesis testing.

Hipotesis	Construct	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values	Decision
Direct Effect							
H1	Land valuation >> policy literacy	0.800	0.802	0.023	35.491	0.000	Yes
H2	Land valuation >> livelihood improvement	0.302	0.324	0.129	2.341	0.019	Yes
H3	Policy literacy >> livelihood improvement	0.242	0.261	0.131	1.843	0.065	No
Indirect effect							
H4	Land valuation >> policy literacy >> livelihood improvement	0.193	0.209	0.106	1.830	0.067	No

The standardized path from Land Valuation to Policy Literacy was positive and statistically significant ($\beta = 0.800$, $p < 0.001$), indicating that stronger perceptions of land value are associated with higher policy literacy among producers. Land Valuation to Livelihood Improvement was likewise positive and significant ($\beta = 0.302$, $p = 0.019$). By contrast, the path from Policy Literacy to Livelihood Improvement was positive in sign but not statistically significant at the 5% level ($\beta = 0.242$, $p = 0.065$). The corresponding indirect effect of Land Valuation on Livelihood Improvement through Policy Literacy was positive but not statistically significant ($\beta = 0.193$, $p = 0.067$), indicating no mediation in the current specification. Effect sizes, predictive relevance, and out-of-sample checks (PLSpredict) were consistent with a model that is primarily driven by Land Valuation in explaining livelihood gains. The strong direct effect of land valuation on livelihood improvement aligns with Sustainable Livelihoods Framework (SLF) perspectives that emphasize the centrality of asset security in shaping livelihood outcomes. In peri-urban frontiers, land operates not only as a factor of production but also as a financial and strategic asset. Perceptions of its value influence investment horizons and risk management more immediately than procedural knowledge. This finding resonates with global evidence that tenure security and land-valuation clarity are primary drivers of agricultural investment in transitioning landscapes.

3.4 Discussion

This study finds a consistent and substantive association between producers’ perceptions of land valuation and their reported livelihood improvement, while policy literacy though positively associated with land valuation does not exert a statistically decisive direct effect

on livelihoods in the present specification. In peri-urban agrarian frontiers, where urban expansion compresses agricultural space and intensifies competition for land, valuation signals covering market prospects, rights clarity, and the liquidity of parcels appear to anchor producers’ investment horizons, risk management, and willingness to remain in production more strongly than procedural knowledge alone. This interpretation aligns with global evidence that the geography of urbanization is likely to directly displace croplands and reprice land uses, especially in emerging economies [11]. In such contexts, land operates not only as a production factor but also as a financial and strategic asset; perceptions about its current and future value structure decision-making and often precede the payoffs to administrative know-how.

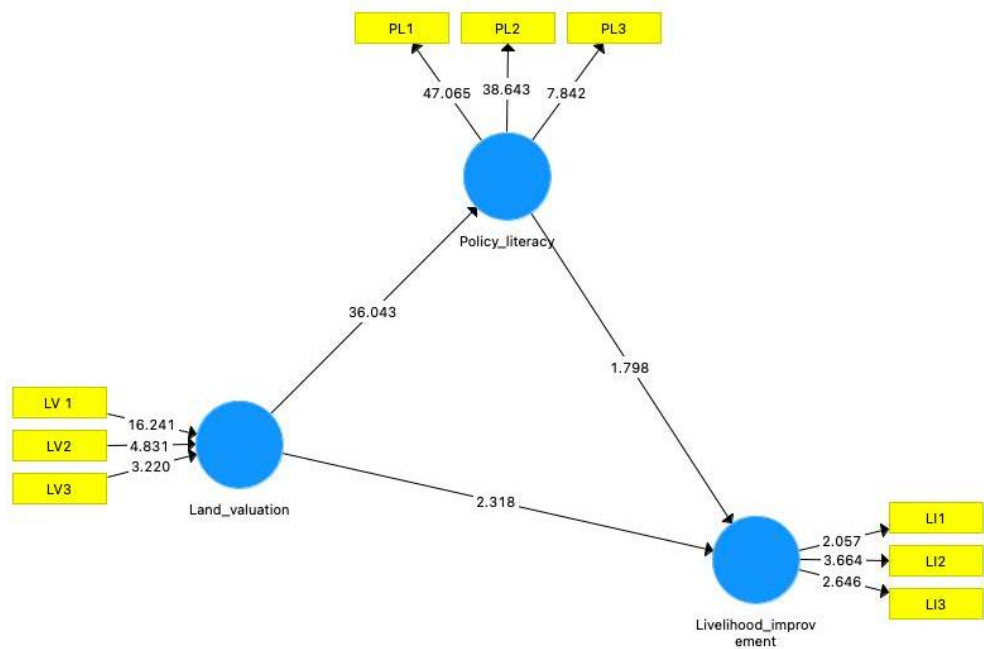


Fig. 1. SEM-PLS structural model linking Land Valuation, Policy Literacy, and Livelihood Improvement

The positive, significant link between land valuation and policy literacy, contrasted with the non-significant direct effect of policy literacy on livelihoods, suggests a binding sequence. Policy literacy defined here as the capacity to understand zoning, permits, environmental thresholds, and biosecurity obligations, may be necessary but not sufficient to translate into measurable livelihood gains when the institutional environment surrounding land rights and valuation is noisy, fragmented, or costly to navigate. Large, multi-country studies consistently show that tenure security and the credible transferability of rights raise land-attached investment, productivity, and environmental stewardship. Where producers face unclear titles, uncertain buffers, or volatile expectations about conversion, the marginal return to knowing the rules is discounted; conversely, when rights are clear and transferable, policy knowledge more readily converts into action through access to credit, contract negotiations, and co-financed upgrades. Our results fit this pattern: land-institution credibility appears to be the primary conversion factor, with policy literacy functioning as a complementary capability whose returns depend on upstream governance quality [8].

The animal-health and biosecurity literature help explain why policy literacy alone may not register as a decisive predictor of livelihood improvements for small and medium poultry

producers. Reviews emphasize that while disease-control know-how is essential, adoption hinges on feasibility space for sanitary buffers, water availability, labor routines, and the cost of materials constraints that are especially binding in peri-urban settings [12]. In low- and middle-income contexts, the burden of endemic and transboundary poultry diseases is well documented, yet compliance often requires capital expenditure that smallholders will not undertake without credible tenure, predictable siting, and reasonable expectations of recouping investments. From this vantage, the strong, direct association between land valuation and livelihoods in our model is economically rational: producers first secure the option value of remaining in place before mobilizing policy knowledge into costly changes to infrastructure and routines.

Situating these findings within the food-security debate reinforces their policy salience. Poultry is the fastest-growing meat globally and a cornerstone of affordable animal protein, especially in urbanizing regions where short production cycles and feed conversion efficiency matter. However, the sector's contribution depends on stable production envelopes: reliable siting, enforceable environmental thresholds, and functioning buffers precisely the elements threatened by peri-urban conversion and fragmented jurisdiction. Empirical syntheses on small-scale poultry and food security indicate that gains for poor households materialize when producers can invest in basic housing, sanitary flows, and input regularity; all three depend on predictable use rights and land-related expectations. Our results therefore imply that, in peri-urban corridors, credible land institutions are a prerequisite for sustained productivity and, by extension, for equitable protein access.

At the governance interface, the distinction between individual policy literacy and system-level integrative capacity is critical. Policy literacy concerns producers' understanding of rules; integrative capacity concerns governments' ability to align spatial planning, animal health, and market regulation across agencies and tiers [13]. Without integrative capacity, well-designed rules can still impose high coordination and compliance costs, lowering the returns to private knowledge. In peri-urban jurisdictions, overlapping mandates and inconsistent enforcement are common; the resulting transaction costs depress the marginal effect of policy literacy on livelihoods even when knowledge is present. This helps to contextualize the non-significant path from policy literacy to livelihood outcomes in our model: the capability exists, but the system in which it is exercised does not yet generate consistent, positive returns.

Two programmatic implications follow. First, interventions that raise the credibility and clarity of land valuation and rights for example, participatory help desks bundling parcel documentation, zoning verification, and permit triage are likely to deliver immediate livelihood benefits by extending planning horizons and improving bargaining positions in both land and contract markets. Such measures are consistent with evidence linking secure, transferable rights to investment and environmental outcomes [14]. Second, policy-literacy modules should be explicitly paired with resource-enabling instruments credit guarantees for biosecurity upgrades, co-financed effluent systems, service-level agreements for licensing to convert knowledge into feasible action [15]. Where these bundles are scaled, one would expect the effect of policy literacy on livelihoods to strengthen, and possibly to mediate valuation livelihood linkages more robustly.

Programmatically, these results advocate for bundled interventions that combine transparent land-valuation services (e.g., participatory valuation help-desks, digital parcel documentation) with policy-literacy modules that are explicitly linked to resource-enabling instruments such as credit guarantees for biosecurity upgrades or co-financed effluent systems. Such bundles can lower the fixed costs of compliance and enhance the marginal returns to policy knowledge. At the system level, strengthening integrative capacity across spatial planning, animal health, and market regulation agencies is critical to reducing

coordination frictions that currently dampen the livelihood returns to producer-level policy literacy.

The absence of a statistically significant mediation through policy literacy should be read as informative rather than disappointing. It indicates that, in the present institutional environment, land valuation exerts primarily direct influence on livelihoods through expectation formation, investment triggers, and market positioning, whereas the knowledge channel remains partially muted by coordination frictions and capital constraints. As urban expansion proceeds, the balance between these channels may shift if integrative capacity improves and if producer-facing instruments lower fixed costs of compliance. Future research should therefore pursue two directions: (1) quasi-experimental or experimental evaluations of bundled interventions that combine rights/valuation services with co-financed biosecurity and streamlined permitting; and (2) longitudinal designs to track how reforms to land administration and cross-agency coordination alter the slope of the policy-literacy livelihood relationship in peri-urban frontiers⁴. In parallel, multi-scale spatial analyses could quantify how specific patterns of urban encroachment modulate returns to policy knowledge and to land-attached investment.

4 Conclusion

In sum, the present evidence supports a governance sequence in which credible land institutions enable, rather than substitute for, producer-level policy capabilities. By prioritizing transparency in valuation and rights, and by pairing policy-literacy initiatives with resource-enabling instruments, policy makers can stabilize peri-urban poultry production and, in doing so, reinforce an essential pillar of affordable protein for rapidly urbanizing population.

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