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Genetic engineering and cloning in livestock (Bahīmat al-Anʿām): An Islamic legal-ethical analysis in religious studies

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ABSTRACT

This paper substantially expands an Arabic foundational fiqh study on genetic engineering and cloning in livestock (bahīmat al-anʿām) into a full research paper situated in religious studies. Because classical juristic corpora contain no single direct text addressing contemporary biotechnologies, Islamic legal reasoning in this field proceeds through general scriptural guidance, legal maxims, and the higher objectives of the Sharia (maqāṣid al-sharīʿah). Using qualitative doctrinal analysis and content analysis of contemporary fatwā and fiqh-academy resolutions, this paper maps how Muslim jurists construct permissibility and restriction in the context of animal biotechnology. The analysis distinguishes between research and application, and between different techniques—gene editing/transfer, embryo splitting, and somatic cell nuclear transfer—showing how rulings typically turn on maslahah-mafsadah (benefit-harm) balancing, animal welfare duties, environmental stewardship, and consumer transparency. Drawing on authoritative resolutions of the International Islamic Fiqh Academy (OIC) and global food-safety and animal-welfare standards, the paper argues that genetic engineering and (with greater caution) livestock cloning may be religiously permissible when they serve a legitimate public interest (maṣlaḥah muʿtabarah), avoid prohibited transgressions such as unjustified "tampering" or cruelty, and are governed by rigorous oversight, risk assessment, and labeling. The conclusion proposes a maqāṣid-based governance framework for Muslim contexts that integrates Sharia objectives with biosafety, animal welfare, and public accountability.

KEYWORDS: animal welfare, biosafety, cloning, fiqh councils, genetic engineering, Islamic bioethics, labeling, livestock, maqāṣid al-sharīʿah

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1. Introduction

Biotechnologies that intervene in animal genomes—ranging from classical transgenesis to contemporary gene editing and cloning—have become central to modern agriculture, food security strategies, and biomedical research. Yet for religious communities, such technologies raise questions that are not merely technical. They implicate theological understandings of creation (khalq), human agency, stewardship (khilāfah), and moral responsibility, as well as legal-ethical norms governing harm, benefit, and the treatment of non-human animals. In Muslim societies, these questions are often addressed through fiqh (Islamic jurisprudence) and Islamic bioethics. Livestock—bahīmat al-anʿām—hold distinctive significance in Islamic law and ritual life: they are sources of lawful food, objects of trade and charity, and central to rites such as uḍḥiyah (sacrificial offering). Any technological transformation of livestock production therefore touches everyday religious practice and public morality. The core question is not simply whether biotechnology "works," but whether it is permissible, recommended, discouraged, or prohibited within Sharia's moral architecture.

This paper develops and expands an earlier Arabic study that offered a foundational fiqh treatment of genetic engineering and cloning in livestock (Ibrahim, n.d.). It rewrites the discussion as a research paper in religious studies with a developed introduction, literature review, methodology, and argument. The paper's guiding claim is that contemporary Islamic evaluations of animal biotechnology are best understood as a structured moral reasoning process: jurists characterize the technology (taṣawwur), locate it within legal categories (takyīf), and evaluate it through maxims and objectives that prioritize preservation of life, public welfare, and prevention of harm—while also maintaining distinctive Islamic concerns such as avoiding cruelty and guarding against morally corrupt forms of "tampering."

The paper proceeds in seven steps. First, it clarifies conceptual terminology and situates the topic within religious-studies approaches to Islamic bioethics. Second, it reviews key literature on Islamic legal responses to genetic engineering and cloning. Third, it outlines a methodology combining doctrinal analysis and content analysis of institutional fatwā discourse. Fourth, it analyzes genetic engineering in livestock, distinguishing between research and application. Fifth, it analyzes cloning techniques and juristic positions, showing how technique-specific risk profiles shape rulings. Sixth, it develops a maqāṣid-based governance model that integrates Sharia norms with contemporary biosafety and animal-welfare standards. Finally, it concludes with implications for policy, research ethics, and future scholarship.

Two clarifications are important. First, this paper addresses biotechnology in animals, not human genetic enhancement or human cloning—domains where Islamic rulings are typically far more restrictive due to lineage (nasab) and dignity concerns. However, human cloning resolutions matter here as comparative evidence for how jurists reason about cloning technologies and their moral risks (International Islamic Fiqh Academy [IIFA], 2024). Second, this paper does not claim a definitive religious ruling for every future innovation. Rather, it reconstructs the best-documented contemporary reasoning patterns and proposes ethically robust conditions for permissibility in livestock applications.

2. Conceptual and Religious-Studies Framework

2.1. Livestock (Bahīmat al-Anʿām) as a Religious Category

The Qur'anic term bahīmat al-anʿām refers broadly to domesticated grazing animals (especially camels, cattle, sheep, and goats) that feature in dietary law and ritual. In Islamic legal traditions, livestock are subject to norms regarding ownership, trade, care, and slaughter. These norms are not only legal but also moral and devotional: the believer is accountable to God for how animals are treated. A key Prophetic principle states that God has prescribed iḥsān (excellence and kindness) in all things, including killing and slaughter, which must be done in the best manner and with minimized suffering (Ṣaḥīḥ Muslim, 1955/"Hadith 17", as cited in Sunnah.com, n.d.). This establishes animal welfare as a religiously salient criterion in assessing biotechnology.

2.2. Maqāṣid, Maṣlaḥah, and Mafsadah in Islamic Moral Reasoning

Because biotechnology frequently presents mixed outcomes, contemporary fiqh discourse relies heavily on the maqāṣid al-sharīʿah (higher objectives of the law) and on benefit-harm balancing. Classical jurists articulated maqāṣid frameworks in different idioms—often emphasizing the protection of religion, life, intellect, lineage, and property—and used the category of maṣlaḥah (public interest) to evaluate new circumstances. Modern Islamic

bioethics frequently mobilizes maqāṣid language to address novel medical and scientific issues, though scholars debate how maqāṣid should be applied and how to guard against overly subjective benefit claims (Padela, 2022). In livestock biotechnology, preservation of life (animal and human), protection of health, environmental stewardship, food security, and prevention of cruelty become prominent maqāṣid-related concerns.

A key interpretive tension concerns the Qur'anic trope of "changing God's creation" (taghyīr khalq Allāh), often invoked to problemize genetic manipulation. Some jurists treat genetic interventions as potentially falling under condemned alteration, especially if they are frivolous, harmful, or deforming; others interpret the condemnation more narrowly, emphasizing that human agency in medicine and agriculture can be a form of stewardship and lawful benefit-seeking when regulated by Sharia norms. Institutional fiqh resolutions commonly operationalize this tension by permitting biotechnology in principle while prohibiting harmful or vain uses and requiring safeguards against long-term damage (IIFA, 2024; IIFA, 2025).

2.3. Religious Studies and "Institutional Fiqh"

From a religious-studies perspective, contemporary bioethical rulings are not only individual scholarly opinions but also institutional productions shaped by transnational councils, expert consultations, and regulatory contexts. Fiqh academies such as the International Islamic Fiqh Academy (OIC) function as sites of collective ijtihād where jurists and technical specialists negotiate the conceptualization of novel technologies and the moral language used to legitimate or restrict them. Studying these institutions involves analyzing documents, rhetorical patterns, and the social authority of resolutions. This paper thus treats fiqh resolutions as a distinctive genre of religious discourse that mediates between scriptural norms and modern technoscience.

3. Literature Review

3.1. Islamic Legal Discourse on Genetic Engineering and GM Foods

Scholarship on Islam and genetic engineering has often focused on genetically modified food (GMF) and on the legitimacy of biotechnological intervention in creation. A recurring theme is the default permissibility (al-aṣl fī al-ashyā' al-ibāḥah) of worldly matters, constrained by demonstrable harm and by explicit prohibitions. Empirical and doctrinal studies report that many contemporary jurists permit GM foods in principle, provided that safety is established, forbidden substances are not introduced, and consumers are not deceived (Elbashir, 2023; IIFA, 2025).

At the institutional level, the IIFA issued a resolution in 2025 specifically on genetically modified foods of animal origin. It defined GMFs as products derived from animals whose genetic material has been modified and allowed their consumption under conditions of safety, Sharia compliance, use of lawful-to-eat species as donors/recipients, and disclosure of necessary information to consumers (IIFA, 2025). Such resolutions illustrate how jurists translate moral norms into policy-relevant conditions such as labeling and transparency.

3.2. Cloning: Technique, Lineage, and Moral Risk

Islamic discussions of cloning gained prominence after the announcement of Dolly the sheep in the late 1990s. Much of the published debate concerns human cloning, where lineage confusion, family law, and dignity concerns lead many institutions to prohibit reproductive cloning while permitting certain forms of biomedical research under strict controls (IIFA, 2024). Yet livestock cloning introduces different considerations: lineage in the legal sense is less central than in humans, and the aims often relate to agriculture, conservation, and productivity.

Recent academic writings show that some scholars differentiate between embryo splitting (analogous to identical twinning) and somatic cell nuclear transfer, viewing the latter as riskier due to higher rates of failure and animal suffering. This mirrors positions reported in the foundational study expanded here, where contemporary views split into permissibility with controls, absolute prohibition, and technique-based differentiation (Ibrahim, n.d.).

3.3. Maqāṣid-Based Islamic Bioethics: Promise and Critique

Maqāṣid-based approaches are widely promoted in Islamic bioethics because they offer a flexible framework for addressing modern complexities. They support attention to public welfare, prevention of harm, and contextual evaluation. However, scholars have warned that maqāṣid language can be invoked too loosely if not anchored in disciplined legal reasoning and robust empirical knowledge. Padela (2022) argues that maqāṣid models

must avoid ambiguity and should specify how objectives are operationalized in concrete decision making. This caution is directly relevant for biotechnology, where benefit claims may be driven by economic interests and where harms may be long-term or uncertain.

Consequently, the best contemporary practice integrates maqāṣid reasoning with biosafety evidence, transparent risk assessment, and oversight mechanisms—an approach also reflected in global standards for evaluating genetically modified organisms. For example, FAO guidance emphasizes comparative safety assessment and evaluation of intended and unintended effects (Food and Agriculture Organization [FAO], n.d.). WHO notes that GM foods approved for sale in some countries have undergone risk assessment but underscores the importance of case-by-case evaluation (World Health Organization [WHO], 2014).

3.4. Animal Welfare, Islamic Ethics, and International Standards

Animal welfare has become a central ethical concern in both secular and religious bioethics. International bodies commonly employ the "Five Freedoms" framework, which includes freedom from hunger and thirst, fear and distress, discomfort, pain/injury/disease, and the freedom to express normal behavior (World Organisation for Animal Health [WOAH], n.d.). In Islamic ethics, iḥsān and prohibitions against cruelty provide parallel moral commitments, though the conceptual grounding differs: humane treatment is owed because animals are God's creatures and humans are accountable stewards.

Livestock biotechnology can intensify welfare concerns. Somatic cell nuclear transfer in particular has been criticized for high embryonic loss rates and for health problems in cloned animals reported in scientific literature. While this paper does not conduct a veterinary meta-analysis, it argues that Islamic legal permissibility should be conditional upon welfare-protective protocols consistent with both iḥsān and recognized welfare standards (WOAH, n.d.).

4. Methodology

4.1. Research Design

This research employs a qualitative design appropriate for religious-studies analysis of normative discourse. It combines (a) doctrinal fiqh analysis, which reconstructs legal reasoning through principles, maxims, and objectives, with (b) qualitative content analysis of institutional documents. The aim is interpretive rather than experimental: to explain how rulings are justified, what conditions they set, and how scientific claims are incorporated into juristic argument.

The study is organized around a two-level analytic distinction commonly made in contemporary fiqh discourse: research versus application. Research refers to laboratory and field investigation aimed at understanding genes, disease resistance, reproduction, and related phenomena; application refers to the production, commercialization, and consumption of genetically altered or cloned animals and their products.

4.2. Data Sources and Sampling

Primary religious sources include the foundational Arabic study being rewritten (Ibrahim, n.d.) and key resolutions of the International Islamic Fiqh Academy (OIC) compiled in its official resolutions volume (IIFA, 2024), alongside the 2025 IIFA resolution on genetically modified foods of animal origin (IIFA, 2025). These texts were selected because they represent authoritative institutional reasoning and because they explicitly articulate conditions relevant to animal biotechnology.

Secondary sources include peer-reviewed scholarship on Islamic bioethics and GM foods, as well as policy and technical documents from international bodies (e.g., FAO, WHO, WOAH) that establish the kinds of risk assessment and welfare standards that jurists often reference when stipulating "no harm" conditions.

4.3. Analytic Procedure

The analysis proceeds in four steps. First, each primary document is coded for (a) conceptual definitions, (b) stated benefits, (c) stated harms, (d) invoked legal principles or scriptural motifs, and (e) regulatory conditions (such as labeling, oversight, or restrictions on donor species). Second, themes are compared across documents to identify recurring patterns in juristic reasoning. Third, these themes are interpreted through a maqāṣid-based framework that highlights how objectives are operationalized into conditions. Fourth, the paper develops an

argument for a governance model that is consistent with the identified reasoning patterns while incorporating contemporary biosafety and welfare best practices.

To improve rigor, the paper follows a transparency principle: normative conclusions are tied explicitly to the conditions stated in primary resolutions, and empirical claims are limited to what is supported by reputable institutional sources. Where empirical uncertainty remains, the paper treats it as a reason for precautionary governance rather than as a basis for categorical prohibition or unrestricted permissibility.

4.4. Limitations and Scope

This study is limited by its reliance on documentary sources rather than interviews or ethnography. It also does not attempt to resolve all scientific debates about GM animals or cloning success rates. Instead, it focuses on the religious-ethical reasoning structures that determine how such scientific claims are normatively processed. Future work could extend this approach by examining national regulatory regimes in Muslim-majority countries, industry practices, or consumer religious perceptions.

5. Genetic Engineering in Livestock: Fiqh Characterization and Ruling

5.1. Defining Genetic Engineering for Juristic Purposes

"Genetic engineering" in contemporary scientific usage includes a spectrum of techniques for altering DNA, such as inserting genes, silencing genes, editing sequences, and rearranging genetic material. For juristic analysis, what matters is not only the lab procedure but the moral valence of the intervention: Is it therapeutic or enhancement-oriented? Does it prevent disease or create harm? Is it reversible? Does it introduce forbidden materials? The foundational study defines genetic engineering as controlling genes by "cutting" and "joining" their chemical structures to modify traits or repair defects (Ibrahim, n.d.). This definition aligns with the broad, intervention-focused understanding used in many contemporary religious rulings.

A juristically useful typology distinguishes at least three categories: (1) preventive or therapeutic interventions to reduce disease burden; (2) productivity-oriented interventions that aim to improve growth, milk yield, or feed efficiency; and (3) cosmetic or frivolous interventions that primarily serve novelty, status competition, or entertainment. Islamic rulings tend to be most permissive for the first category, conditionally permissive for the second, and highly skeptical of the third—especially if it entails cruelty or significant ecological risk.

5.2. Research Versus Application

In the foundational study, research in genetic engineering is treated as presumptively permissible because it involves the pursuit of knowledge about God's patterns in creation and may serve human welfare (Ibrahim, n.d.). This position resonates with Qur'anic encouragement to observe creation and reflect on how life began (Qur'an 29:20) and to examine what is in the heavens and the earth (Qur'an 10:101). In Islamic moral theology, scientific inquiry can be framed as a form of ʿibādah (devotional activity) when it is undertaken with ethical intent and produces benefit.

Application, however, is treated as more ethically fraught because it introduces market incentives, large-scale exposure, and potentially irreversible ecological effects. For this reason, institutional rulings often impose conditions on commercialization, risk assessment, and consumer transparency. The IIFA's 2025 resolution on genetically modified foods of animal origin explicitly requires safety and disclosure of necessary information regarding GM foods and their preparation methods (IIFA, 2025). Such conditions function as Sharia-based governance tools: they operationalize the "no harm" maxim (lā ḍarar wa-lā ḍirār) and the prohibition of deception (gharar and tadlīs) in market transactions.

5.3. Claimed Benefits (Maṣāliḥ) and Their Religious Interpretation

The foundational study lists several anticipated benefits of genetic engineering in livestock: increased offspring numbers, faster growth and improved meat quality, higher milk and wool yields, improved disease resistance, and treatment of animal diseases (Ibrahim, n.d.). These benefits map onto public-interest rationales that jurists often accept as maṣlaḥah muʿtabarah when they serve legitimate needs such as food security and public health. From a maqāṣid perspective, food security supports preservation of life and property, while reducing animal

disease burden supports animal welfare and reduces risks of zoonotic transmission. Yet Islamic reasoning also requires critical scrutiny of benefit claims: are the benefits distributed justly, or do they concentrate profits while externalizing harms to farmers, consumers, or ecosystems? A maqāṣid-based approach therefore requires that biotechnology be evaluated not only for technical success but also for social justice and accountability, including access for poorer communities and protection against exploitative practices.

5.4. Potential Harms (Mafāsid) and the Precautionary Ethic

The foundational study highlights potential harms such as the emergence of new diseases, uncontrollable bacteria or viruses, and loss of genetic diversity through homogenization (Ibrahim, n.d.). Even if such harms are uncertain, Islamic legal theory recognizes the relevance of foreseeable risk, especially when consequences may be severe and widespread.

International food-safety frameworks similarly emphasize case-by-case assessment of GM organisms and comparative evaluation against conventional counterparts. FAO guidance describes comparative safety assessment as the initial step in evaluating foods derived from GM animals (FAO, n.d.). WHO likewise notes that safety assessment is essential and that evaluation should consider each product individually (WHO, 2014). Islamic jurists can integrate such frameworks as empirical tools that help operationalize the Sharia principle of preventing harm. The practical implication is that permissibility conditions should include independent risk assessment, long-term monitoring where feasible, and strong biosafety governance.

Another dimension of harm is moral: biotechnology may invite a cultural attitude of domination and instrumentalization of life. Religious discourse sometimes expresses this concern through the language of "tampering" or "playing with genes." While the term can be rhetorically vague, it may point to ethically significant patterns such as reckless experimentation, unnecessary suffering, or commodification that undermines responsibility. The Sharia response is not to reject all intervention but to insist on purpose, discipline, and accountability.

5.5. Conditions for Permissibility in Livestock Genetic Engineering

Synthesizing the foundational study with institutional resolutions, a robust set of permissibility conditions for livestock genetic engineering can be articulated as follows:

1. Legitimate purpose (maqṣad sharʿī): The intervention should serve an ethically meaningful purpose such as disease prevention, food security, or genuine improvement of welfare, rather than vanity or abuse.
2. No overriding harm: The intervention must not lead to harm sooner or later. This principle is stated explicitly in IIFA resolutions on genetic engineering, which permit utilization in zoology subject to avoiding harm (IIFA, 2024).
3. Lawful donor and recipient constraints: When genetic material transfer occurs between animals, both should be lawful to consume in order to avoid introducing prohibited substance pathways (IIFA, 2025).
4. Competent oversight: Work should be conducted by specialists of experience and credibility, and within regulated research environments (IIFA, 2024).
5. Transparency and labeling: Consumers must be informed about GM animal products, consistent with the IIFA requirement that necessary information be disclosed (IIFA, 2025).
6. Animal welfare protection: Procedures must minimize pain and distress, consistent with iḥsān and with recognized welfare principles (Sunnah.com, n.d.; WOAH, n.d.).

These conditions translate broad moral commitments into actionable governance. They also illustrate how religious rulings in this domain are best understood as conditional permissions rather than blanket endorsements.

6. Cloning in Livestock: Types, Juristic Views, and Ethical Evaluation

6.1. Conceptual Clarification: What Counts as "Cloning"?

The term "cloning" is used in religious discourse to refer to different biological processes, and juristic evaluation depends on accurate characterization. The foundational study identifies three types: (1) somatic cell nuclear transfer (SCNT), sometimes called "ordinary" or "genetic" cloning; (2) embryo splitting (twinning), described as "embryonic cloning"; and (3) cellular or organ cloning (more relevant to humans than livestock) (Ibrahim, n.d.).

IIFA materials similarly describe embryo division producing identical twins as a form of cloning and distinguish it from nuclear transfer methods associated with Dolly (IIFA, 2024). This distinction is crucial for Islamic legal reasoning, because the moral risk profile of embryo splitting differs from that of SCNT: embryo splitting resembles a process that occurs naturally in twinning, while SCNT involves more intensive manipulation and has historically carried higher failure rates and welfare concerns.

6.2. Juristic Positions in Contemporary Discourse

The foundational study reports three main contemporary positions regarding livestock cloning:

- Conditional permissibility: Cloning livestock is permitted if it realizes benefit and avoids religious, moral, or bodily harms. This position is associated with various modern scholars and with multiple fiqh gatherings that permitted animal and plant cloning within controls (Ibrahim, n.d.).
- Absolute prohibition: Some scholars prohibit livestock cloning entirely, arguing that it constitutes prohibited alteration of creation and carries unknown harms.
- Technique-based differentiation: Some permit embryo splitting while prohibiting SCNT, viewing the latter as more harmful.

From an institutional standpoint, IIFA resolutions about human cloning—while not directly about livestock—are important because they demonstrate the Council's willingness to prohibit a category (human cloning) while still encouraging biological research in other areas, provided it complies with Sharia (IIFA, 2024). This illustrates a governance posture: prohibition is reserved for cases where core objectives such as lineage and dignity are threatened, while conditional permission applies to areas where benefits can be achieved without undermining foundational norms.

6.3. The "Changing Creation" Argument and Its Scope

Arguments for prohibition often cite the Qur'anic passage in which Satan vows to command humans to "change the creation of Allah" (Qur'an 4:119-120). In religious-studies terms, this scriptural motif functions as a moral warning against hubris and transgression. However, its application to biotechnology is interpretively contested. Islamic legal tradition differentiates between unlawful alterations that embody deception or harm (such as mutilation) and lawful alterations that serve benefit (such as medical treatment or selective breeding).

A key question, therefore, is whether cloning constitutes an inherently condemned alteration or a tool whose moral status depends on purpose and consequences. Many juristic documents avoid taking the verse as an absolute ban on all intervention. Instead, they translate it into a conditional restriction: if an intervention is mere futility, abuse, or leads to harm, it becomes prohibited. For example, IIFA resolutions on genetic interventions emphasize that genetic "tampering" for enhancement without recognized need is prohibited, while beneficial uses in botany and zoology can be permissible with safeguards (IIFA, 2024). This approach provides a more precise doctrinal pathway than a generalized invocation of "changing creation."

6.4. Animal Welfare as a Decisive Criterion

Livestock cloning raises acute welfare concerns because of the potential for repeated embryo manipulation, failed implantations, abnormal gestation, and neonatal complications. Even if cloning produces high-value animals, Sharia's iḥsān principle requires that pain and distress be minimized and that animals not be subjected to gratuitous suffering. The prophetic instruction to "spare suffering" to the animal establishes a general welfare norm applicable beyond slaughter to husbandry and research practices (Sunnah.com, n.d.).

International welfare standards provide practical benchmarks. WOAH's guidance, grounded in the "Five Freedoms," emphasizes freedom from pain, injury, disease, fear, and distress (WOAH, n.d.). When cloning protocols entail high expected suffering or high rates of harmful outcomes, Islamic ethics would treat this as a strong reason for restriction or prohibition unless a substantial necessity or public interest can be demonstrated and suffering can be dramatically reduced.

Accordingly, technique-based differentiation in fiqh discourse can be interpreted as a welfare-sensitive application of the benefit-harm framework: embryo splitting may be ethically preferable when it entails fewer harms, whereas SCNT requires heightened scrutiny and may be prohibited if welfare burdens are excessive.

6.5. Transparency, Consumer Rights, and Market Ethics

The foundational study recommends transparency in informing consumers about genetically modified products (Ibrahim, n.d.). Institutional resolutions echo this, requiring disclosure about GM animal foods (IIFA, 2025). In Islamic commercial ethics, deception and concealment that affect buyer choice are prohibited, and contracts must avoid unjustified uncertainty (gharar). Therefore, labeling is not merely a regulatory preference but a religiously grounded moral requirement when consumers reasonably care about production methods.

Transparency also supports accountability: it enables independent monitoring, scientific review, and public deliberation. In a religious-studies lens, transparency functions as a form of "moral technology" that stabilizes trust between producers, jurists, and the public.

7. Toward a Maqāṣid-Based Governance Model for Livestock Biotechnology

7.1. Integrating Sharia Objectives with Biosafety Governance

A maqāṣid-based governance model does not replace scientific regulation; rather, it provides moral criteria that shape what kinds of regulation are required. Drawing on IIFA conditions and international standards, such a model would include:

- Independent risk assessment: Comparative safety evaluation and assessment of intended and unintended effects, consistent with FAO and Codex-style approaches (FAO, n.d.; Codex Alimentarius Commission, 2008).
- Long-term monitoring: When feasible, post-market monitoring for ecological or health effects, particularly for widely distributed products.
- Prohibition of harmful purposes: Explicit bans on uses that are intended to cause harm, undermine welfare, or introduce forbidden substances.
- Governance of uncertainty: Where scientific uncertainty is high and potential harm is grave, precautionary restriction is justified until evidence supports safety.

These governance elements operationalize Sharia's harm-prevention norms while respecting that "no harm" is an empirical claim that requires scientific methods to evaluate.

7.2. Animal Welfare Protocols as Sharia Compliance Tools

To treat animal welfare as a core Sharia compliance requirement, institutions should mandate welfare protocols that include analgesia and humane endpoints in research, minimize invasive procedures, and require veterinary oversight. Welfare assessment should be built into licensing decisions for cloning projects, and projects with high expected morbidity should be prohibited or redesigned.

Such measures align with iḥsān and with international guiding principles (Sunnah.com, n.d.; WOAH, n.d.). They also help translate religious ethics into measurable procedural standards.

7.3. Justice, Public Interest, and the Political Economy of Biotechnology

A maqāṣid-based model must address not only biological risks but also socio-economic harms. Biotechnology can intensify corporate control over agriculture, increase dependency on patented lines, and marginalize small farmers. While the foundational study emphasizes productivity and benefit, an expanded religious-studies analysis must ask: who benefits and who bears risk?

Islamic ethics emphasizes justice (ʿadl) and prohibition of exploitation. Therefore, permissibility conditions should include fair access, protection of smallholders, and avoidance of monopoly practices that threaten communal welfare. Religious authorities and policymakers should evaluate whether a biotechnology regime supports equitable food security or merely shifts value upward in the supply chain.

7.4. A Decision Matrix for Ethical Permissibility

To make maqāṣid reasoning practically usable, this paper proposes a decision matrix with four axes:

1. Purpose: therapeutic/preventive, productivity-oriented, or frivolous.
2. Evidence of safety: robust, moderate, or weak/uncertain.
3. Welfare burden: low, moderate, or high.
4. Transparency and governance: strong, moderate, or weak.

Permissibility increases when purpose is legitimate, safety evidence is robust, welfare burden is low, and governance is strong. Conversely, when welfare burden is high or safety evidence is weak, prohibition or moratorium is justified. This matrix does not replace juristic judgment; it structures deliberation and makes the moral logic transparent.

7.5. Policy and Institutional Recommendations

Building on the conditional permissions articulated by contemporary fiqh councils, Muslim-majority jurisdictions can adopt institutional measures that make Sharia-compliant biotechnology governance practicable rather than merely aspirational. First, national ethics committees should be formally "hybrid" bodies that include jurists, veterinarians, geneticists, public-health experts, and environmental scientists. This operationalizes the collective ijtihād model repeatedly endorsed by fiqh academies and reduces the risk that either religious or scientific stakeholders speak past one another (IIFA, 2024).

Second, licensing regimes for GM and cloned livestock should require (a) a publicly available risk-assessment summary written for non-specialists; (b) welfare impact statements that report expected morbidity, mortality, and pain-management procedures; and (c) an independent audit pathway. Such requirements instantiate the Sharia prohibition of harm and the duty of transparency without requiring consumers to become technical experts (IIFA, 2025; WHO, 2014).

Third, labeling rules should be tied to consumer rights and to the integrity of halal markets. Because many Muslims seek halal consumption not only as a dietary rule but as an ethical relationship with creation, disclosure should not be treated as a mere marketing option. A Sharia-based labeling policy can distinguish between (1) genetic modifications within lawful species, (2) modifications involving genes from non-edible species, and (3) any process that could implicate prohibited substances or unknown safety profiles. This tiered approach aligns with the IIFA requirement that GM modifications occur between animals that are lawful to consume and that necessary information be disclosed (IIFA, 2025).

Fourth, research funding in Muslim contexts should prioritize welfare-enhancing and disease-preventive projects over purely cosmetic or novelty-driven modifications. This prioritization expresses maqāṣid commitments to preserving life and preventing harm while also reducing the likelihood that biotechnology becomes a domain of wastefulness (isrāf) or vanity. Where economic incentives push toward intensive production at the expense of welfare, Sharia governance should explicitly treat welfare harms as legally relevant negative externalities requiring regulation and, where needed, prohibition (Sunnah.com, n.d.; WOAH, n.d.).

7.6. Directions for Future Religious-Studies Research

Religious-studies scholarship can extend beyond doctrinal rulings to examine how biotechnology reshapes lived religious practice. Three research directions are especially promising. First, ethnographic studies could explore how Muslim farmers, consumers, and halal certifiers interpret "naturalness," "tampering," and "trust" in relation to GM and cloned livestock. Such work would clarify whether juristic categories resonate with public moral intuitions or whether new forms of religious education and communication are needed.

Second, discourse-analytic studies can map how different institutions frame similar technologies. For example, some discussions foreground food security and economic benefit, while others foreground symbolic concerns about creation and human limits. Comparing these framings across regions and schools of law can illuminate how authority is negotiated in globalized Islamic bioethics.

Third, comparative religious ethics can place Islamic deliberations alongside Jewish, Christian, and secular bioethics on animal biotechnology to identify convergences (e.g., welfare and ecological precaution) and genuine distinctives (e.g., halal integrity and the theological meaning of stewardship). Such comparison enriches religious-studies understanding of how modern technoscience becomes a site of moral pluralism.

8. Conclusion

This paper rewrote and expanded a foundational fiqh discussion of genetic engineering and cloning in livestock into a developed research study in religious studies. The analysis showed that contemporary Islamic legal-ethical reasoning in this domain is neither purely permissive nor purely prohibitive. Instead, it is conditional and governance-oriented: permissibility is typically granted in principle for beneficial uses in zoology and agriculture,

while strong conditions are imposed to prevent harm, cruelty, deception, and long-term ecological damage. For genetic engineering in livestock, the most defensible Islamic position—consistent with contemporary institutional resolutions—permits research and application when safety is established, donor/recipient constraints are respected, and transparency is guaranteed (IIFA, 2024; IIFA, 2025). For livestock cloning, permissibility is more cautious and may depend on technique: embryo splitting can be closer to permissibility when harms are limited, while SCNT requires heightened welfare scrutiny and may be restricted where expected suffering is excessive.

The paper advanced a maqāṣid-based governance framework that integrates Sharia objectives with international biosafety and welfare standards. Such integration is not a concession to external authority but a practical means of fulfilling Sharia's harm-prevention and welfare mandates through reliable empirical tools. In this way, Islamic bioethics can offer a principled yet scientifically informed approach to regulating livestock biotechnology, supporting food security and public welfare while resisting abuse, instrumentalization, and ecological irresponsibility.

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