



Assessment of Knowledge Gaps among *Pashusakhis* Providing Community-based Animal Healthcare Services in the North-Eastern Part of Uttar Pradesh

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ABSTRACT

The study was conducted during April to June, 2025 in the Bahraich district under the north-eastern part of Uttar Pradesh, India to assess the knowledge gap among women community animal health workers popularly known as *Pashusakhi* using a 50-statements based quiz covering the various aspects of animal healthcare like feeding and nutrition, disease management, extension and record keeping etc. A total 20 *Pashusakhis* serving across 20 different villages participated in the study. The findings revealed that *Pashusakhis* possessed foundational knowledge in basic animal healthcare and preventive management, with high mean scores in areas such as colostrum feeding, disease isolation and advisory roles as extension agents. However, knowledge gaps were identified in specialised and technical thematic areas like advanced nutritional management, especially safe urea feeding practices, breeding and reproduction management, biosecurity measures and emergency first aid skills. Socio-cultural barriers, limited exposure to advanced technical training, and lack of refresher trainings were identified as contributing factors to these gaps. The study indicated that *Pashusakhi* model effectively supported the grassroots livestock veterinary service delivery as capable animal healthcare service providers but strengthening technical capacity through periodic refresher trainings, standardized training modules and gender-sensitive training approach along with institutional support was important for the effective implementation of the *Pashusakhi* model. The findings highlight the need for continuous capacity building and policy-level recognition to enhance the sustainability and impact of the *Pashusakhi* model in rural livestock healthcare systems.

KEYWORDS: *Pashusakhi*, knowledge gaps, CAHWs, extension, capacity

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1. INTRODUCTION

Livestock production constitutes an important part of rural livelihoods, food security, and agricultural sustainability across developing countries. Livestock productivity continues to be constrained by infectious diseases, inadequate preventive healthcare, and limited accessibility to veterinary services. Strengthening animal health delivery systems has therefore become a global priority to ensure sustainable livestock development and improved farmer welfare. Community based animal health workers (CAHWs) as defined by the World Organization for Animal health (Anonymous, 2024a) are the individuals selected among by the community members to serve the basic needs of the remote livestock farmers and act as the bridge between the conventional veterinary services and remote areas (Nimbalkar et al., 2025). Ravikumar et al. (2016) reported that knowledge of women strengthen community-based livestock health services as *Pashusakhis* in India are such women working as a community-based animal healthcare service providers as well as local extension agents operating under the supervision of some designated authorities like government veterinary hospitals, NGOs working in the domain of rural livelihood generation, animal husbandry sector, etc. Kumar et al. (2025) reported an overall positive perception among livestock farmers towards services provided by *Pashusakhis*, highlighting their substantial perceived value, accessibility, and farmer satisfaction. Early evidence demonstrated that community animal health workers significantly improved livestock healthcare service delivery, vaccination coverage, and farmer access to veterinary care where professional services were scarce (Mugunieri et al., 2004). Studies evaluating CAHW knowledge and practices in dairy production systems also indicate that competency levels directly influence the adoption of recommended animal health practices among livestock farmers (Lwin, 2025). Technical knowledge and skill enhancement remain core requirements for the effectiveness of animal healthcare service providers as strengthened competencies are directly linked with improved livestock health outcomes and economic efficiency in livestock production system (Kappes et al., 2023). Research conducted among veterinary healthcare teams highlights that professional knowledge, attitudes, and practical application strongly determine the quality of advisory and clinical services delivered to animal owners (Lumbis and Scally, 2020). Consequently, periodic assessment of knowledge levels and identification of training gaps are essential to ensure competency based service delivery. Pandey and Rai (2024) identified technical gaps limiting women's participation in animal husbandry also recent methodological reviews have further stressed the need for systematic evaluation of CAHWs curricula

and training programmes to maintain standardization, improve learning outcomes, and enhancing programme sustainability (Matos et al., 2026). Evidence from Uganda demonstrated that gender roles significantly influence ruminant disease management practices and effectiveness of disease control programmes (Namatovu et al., 2025). A review conducted in Ethiopia revealed that participation in animal health interventions contributes to women's empowerment through improved income control, enhanced decision-making authority, and increased social recognition within extensive livestock production systems (Gehano et al., 2025). These findings highlight the transformative potential of gender-responsive community animal health programmes. In India, the *Pashusakhi* model represents a localized and gender-inclusive adaptation of the CAHW framework. *Pashusakhis* are trained rural women engaged as community-level animal healthcare providers and grassroots livestock extension agents operating under the supervision of government veterinary departments, non-governmental organizations, and rural livelihood missions. The model simultaneously addresses last-mile veterinary service delivery gaps and promotes women's socio-economic empowerment as Kumar et al. (2026) reported livestock farmers' willingness to pay for preventive animal healthcare services delivered by *Pashusakhis*. The present study assessed the knowledge gap among *Pashusakhis* in Uttar Pradesh, where the *Pashusakhi* model had been operating in its initial phase and was relatively a new initiative compared to states like Bihar, Jharkhand and Maharashtra where the *Pashusakhi* model has demonstrated exemplary results in the form increase livestock productivity and decreased mortality (Anonymous, 2024b and De, 2025). The objective of this study was to identify the existing knowledge gaps among *Pashusakhis* in various domains of animal healthcare along with extension services.

2. MATERIALS AND METHODS

The study was conducted during April, 2025 to June, 2025 in the north-eastern part of Uttar Pradesh in Bahraich district which came under Devipatan division. In the district Chitaura block was purposively selected, where 20 *Pashusakhis* were chosen randomly who were serving across 20 different villages as a community-based animal health worker as well as extension agents. Primarily these women were involved with vaccination drive, deworming, basic first-aid treatment of livestock along with providing advisory services on management practices and healthcare of the animals to the livestock farmers. A Gap score analysis was done using a structured 50 statements-based quiz covering areas such as feeding and nutrition, disease management, breeding and reproduction, vaccination and deworming. The responses were coded as 'Yes' or 'No' and

were evaluated against an answer key to identify the key thematic areas, where *Pashusakhis* exhibited knowledge gaps.

3. RESULTS AND DISCUSSION

The gap score analysis results of the *Pashusakhis* who participated in the quiz across the following thematic areas are as follows

3.1. Basic healthcare and hygiene

The knowledge gap assessment of *Pashusakhis* demonstrated a high level of proficiency in fundamental animal healthcare and hygiene (Table 1). A significant majority (95%) understood their core responsibilities as Community Animal Healthcare Workers (CAHWs), including tasks such as assisting with calving (Q2) and ensuring the proper disposal of animal waste (Q6). Their strong grasp of preventive measures was also evident, with 95 percent *Pashusakhis* recognising the importance of washing udders before milking (Q5). While their foundation regarding basics of animal health was robust, minor gaps were observed in more technical areas. A slight variation in scores was noted for the importance of well-ventilated animal sheds (85%, Q3). A more pronounced knowledge gap was identified regarding the requirement for separate feeding and resting spaces for animals, with a mean score of 0.70 (Q4). Basic animal healthcare and hygiene practices are widely recognised as essential components for disease prevention and improved livestock productivity (Lwin, 2025). Lewa et al. (2020), emphasized that CAHWs must receive continuing supervision and refresher training in order to maintain their technical expertise and provide animal health services in an efficient manner. This finding indicates that while the initial training was effective for core skills, a need for more advanced learning and regular refresher courses exists to ensure knowledge retention and comprehensive expertise.

Table 1: Mean scores on basic healthcare and hygiene (N=20)

Statements for basic healthcare and hygiene	Mean score (correct)
Pashusakhis are responsible for basic animal healthcare (Q1)	0.95
Assisting an animal during calving is not a part of a Pashusakhi's job (Q2)	0.95
Animal sheds should be well-ventilated (Q3)	0.85
It is not required to have a separate feeding and resting space for animals (Q4)	0.70
It is very important to clean the udder before milking (Q5)	0.95
Proper disposal of animal waste is necessary (Q6)	0.95

3.2. Nutrition and feeding practices

Pashusakhis knowledge regarding nutrition and feeding practices (Table 2) revealed a mixed proficiency. They demonstrated a strong grasp of universally recognized principles, with high scores on the necessity of feeding colostrum to newly born calves (90%, Q7) and the increased protein needs of lactating animals (90%, Q16). The importance of adjusting feed rations based on different stages like growth, lactation, or pregnancy was also well understood, with a mean score of 0.80 (Q14). However, significant knowledge gaps were identified in more specialized technical areas. A critical gap was related to the dangers of feeding urea directly to animals, with a very low mean score of 0.10 (Q12), indicating a widespread lack of awareness. Similarly, only a small percentage (35%, Q13) correctly identified that feeding excess concentrate during late pregnancy can lead to kidding difficulties. These findings suggested that the existing training model for *Pashusakhis* successfully imparted foundational, low-cost feeding practices but did not adequately cover complex nutritional management. Similar observations have been reported in veterinary nutrition studies, where awareness of nutritional principles was relatively high but consistent

Table 2: Mean scores on nutrition and feeding (N=20)

Statements on nutrition and feeding practices	Mean score (correct)
Should a newly born calf be given colostrum within the first 2 hours (Q7)	0.90
Is it advisable to suddenly switch from dry fodder to fresh green fodder in large quantities (Q8)	0.75
Can feeding too many grains cause indigestion in cattle (Q9)	0.70
Mineral mixture does not help in reproductive health management (Q10)	0.70
Does a cow get the same amount of energy from 1 kg of grass as from 1 kg of maize (Q11)	0.75
Is it safe to feed urea directly to animals if mixed in small quantities with water (Q12)	0.10
Can feeding excess concentrate during late pregnancy increase the chances of kidding difficulties in goats (Q13)	0.35
Is it necessary to adjust feed rations according to the animal's stage-growth, lactation, pregnancy (Q14)	0.80
Can feeding spoiled or mouldy feed cause deficiency diseases in livestock (Q15)	0.75
Lactating animals need more protein than dry animals (Q16)	0.90

application of systematic and advanced nutrition practices remained limited among animal health service providers (Lumbis and Scally, 2020). Additionally, a study on livestock extension and the provision of animal health services highlighted the importance of ongoing capacity building and focused training in enhancing the technical proficiency of frontline animal health workers, especially in specialised fields like nutrition, feeding management, and advisory services (Lwin, 2020). Therefore improving advisory services for livestock farmers would require a greater focus on these advanced domains in future trainings and refresher programs.

3.3. Disease management

Pashusakhis knowledge concerning disease management revealed a bifurcated understanding, with strong proficiency in general preventive practices but critical gaps in specific technical areas. The results, as detailed in Table 3, showed that *Pashusakhis* possessed a solid grasp of foundational concepts. For instance, a high percentage of respondents correctly identified that diarrhoea in young goats could result from poor-quality feed (90%, Q20) and that intestinal parasites could cause diarrhoea even without fever (85%, Q21). The importance of isolating sick animals to prevent the spread of disease was also well-understood (85%,

Q26). These findings underscored a successful transfer of basic, practical knowledge during their training. However, significant deficiencies were noted in two key areas. The first was lack of understanding regarding responsible medication use and disease transmission. Only a minority of the *Pashusakhis* (40%) knew not to give antibiotics without veterinary advice (Q24), and an equally low number (40%) understood that not all infectious diseases spread exclusively through direct contact (Q25), indicating a potential risk in managing outbreaks. Secondly, there was a widespread knowledge gap regarding *Peste des Petits Ruminants* (PPR), a serious disease. The scores were consistently low for questions on PPR's severity (45%, Q18), including specific signs like high fever and mouth odour (60%, Q23), and whether a specific cure existed (60%, Q19). Namatovu et al. (2025) reported in smallholder livestock systems, where gendered roles influenced access to animal health knowledge and disease management capacity, thereby affecting effective control of diseases such as PPR and Rift Valley Fever. Similarly, strengthening technical competencies through focused training, ongoing mentoring, and veterinary support improves disease surveillance, early detection, and control of transboundary animal diseases in rural livestock systems, according to a study on women Community Animal Health Workers (CAHWs) in East Africa (Worku et al., 2025). This indicated that while *Pashusakhis* could identify common symptoms, their knowledge was insufficient for dealing with specific, high-risk diseases like PPR. These gaps suggested a need for more advanced, disease-specific training to improve their advisory capacity and mitigate potential health risks in livestock.

3.4. Breeding and reproduction

The assessment of *Pashusakhis* knowledge regarding breeding and reproduction practices revealed significant and concerning gaps. As shown in Table 4, a basic lack of understanding was observed in several key areas. The ability to estimate an animal's age by the dentition method (Q32) and the importance of record keeping for breeding management (Q29) was poorly understood, with mean scores of 0.40 and 0.45, respectively. Equally critical gaps were evident in understanding reproductive cycles; only half of the respondents knew that goats did not come into heat year-round (Q27), and a mere 30% were aware of silent heat as a major problem in buffaloes (Q31). While there was a moderate understanding of the gestation period difference between goats and sheep (Q28, mean score 0.60) and a correct understanding of the role of artificial insemination (AI) in disease prevention (Q30, mean score 0.70), these positive findings were overshadowed by the widespread deficiencies in core knowledge. The identified gaps in foundational skills such as age estimation and record keeping, combined with a lack of awareness of specific

Table 3: Mean scores on disease management (N=20)

Statements on disease management	Mean score (correct)
Pashusakhis are trained to identify common animal diseases (Q17)	0.80
Is Peste des Petits Ruminants (PPR) more severe in goats than in sheep (Q18)	0.45
Is there a specific cure available for PPR in goats (Q19)	0.60
Can diarrhoea in young goats be a result of a sudden feed change or poor-quality feed (Q20)	0.90
Can goats get diarrhoea from intestinal parasites even without a fever (Q21)	0.85
Can early detection and isolation of PPR-affected goats reduce mortality in the flock (Q22)	0.65
Is sudden high fever and foul mouth odour a sign of PPR in goats (Q23)	0.60
Should you give antibiotics to animals without veterinary advice (Q24)	0.40
Do all infectious diseases spread only through direct animal-to-animal contact (Q25)	0.40
It is important to isolate sick animals from healthy animals in a herd (Q26)	0.85

Table 4: Mean scores on breeding and reproduction (N=20)	
Statements on breeding and reproduction	Mean score (correct)
Do goats come into heat year-round like cattle and buffalo (Q27)	0.50
Is the gestation period of a goat and sheep the same (Q28)	0.60
Is record keeping important for heat detection, insemination, and predicting calving/kidding dates (Q29)	0.45
Is artificial insemination (AI) unimportant for preventing the spread of sexually transmitted diseases (Q30)	0.70
Is silent heat a problem in heat detection in the case of buffalo (Q31)	0.30
Do you know how to estimate the age of animals by the dentition method (Q32)	0.40

reproductive challenges, suggested that the *Pashusakhis* might not be adequately equipped to provide comprehensive advisory services to livestock farmers on breeding and reproductive health, which could lead to sub-optimal herd management.

Gehano et al. (2025) reported in community-based livestock extension programmes, where women community animal health workers often receive limited exposure to reproductive health training due to sociocultural sensitivities, gender norms, and male-dominated training environments that restrict open discussion on breeding and reproductive topics. Cultural taboos surrounding reproductive discussions and the predominance of male trainers may therefore have contributed to avoidance of detailed teaching on animal reproductive physiology among *Pashusakhi*. Tesfa et al; (2025) underlined that the effectiveness and durability of community-based breeding and animal health interventions relied on strong stakeholder participation, continual technical support, monitoring and evaluation, and continued capacity-building activities.

3.5. Vaccination and deworming

The assessment of *Pashusakhis* knowledge on vaccination and deworming presented a pattern similar to other domains, a mix of sound fundamental understanding and significant technical gaps (Table 5). The results showed a strong comprehension of core concepts, as evidenced by high scores on the role of internal parasites in affecting animal growth (80%, Q40) and the specific requirement of vaccinating goats against PPR at four months of age (85%, Q34). The *Pashusakhis* also correctly understood that vaccination was a key service they provide (85%, Q33) and mostly knew that deworming was not always safe for weak animals (75%,

Table 5: Mean scores on vaccination and deworming (N=20)	
Statement on vaccination and deworming	Mean score (correct)
Is vaccination not a service provided by <i>Pashusakhis</i> (Q33)	0.85
Is it necessary to vaccinate goats against PPR at 4 months of age (Q34)	0.85
Should deworming be done at least one week before vaccination for better immunity (Q35)	0.55
Is it safe to give two different vaccines on the same day (Q36)	0.60
Should deworming in calves be started as early as 15 days of age (Q37)	0.15
Is it safe to vaccinate pregnant animals without consulting a veterinary doctor (Q38)	0.50
Is cold storage not necessary to be maintained if a vaccine is used within the same day (Q39)	0.40
Can internal parasites affect animal growth (Q40)	0.80
Is deworming always safe, even for weak animals (Q41)	0.75
Is it not advised to change deworming medicine from time to time (Q42)	0.45
Can we use the same needle for more than one animal during vaccination (Q43)	0.55
Is there no need to vaccinate animals if a disease has not been reported recently (Q44)	0.55

Q41). However, critical knowledge gaps were identified. The most alarming gap was a near-total lack of awareness regarding early deworming protocols for calves, with a very low mean score of 0.15 (Q37). Similarly, a majority failed to recognize the critical need for cold storage for vaccines for short durations (40%, Q39). Additionally, only half of the respondents knew to consult a veterinarian before vaccinating pregnant animals (50%, Q38). The practice of re-using needles was also a concern, as a significant number of *Pashusakhis* believed it was permissible (55%, Q43). These findings highlighted a need for targeted training on advanced biosecurity protocols and technical knowledge to mitigate risks associated. Mugunieri et al. (2004) and Liao (2025) reported that CAHWs emerged as an important alternative service delivery mechanism following the restructuring and liberalization of veterinary services, particularly in areas where professional veterinary services were limited or inaccessible. This aligned closely with the role of *Pashusakhis* in the present study, who function as frontline service providers bridging the gap between formal veterinary systems and rural livestock farmers.

3.6. Emergency and first aid skills

The evaluation of *Pashusakhis* emergency and first aid skills revealed a notable dichotomy (Table 6). They demonstrated a strong understanding of professional referral, with a perfect mean score of 1.00 for having a veterinarian's contact number and a high score of 0.90 for knowing when to refer severe cases. This indicated that they recognized their limitations and were effective in acting as a crucial link to professional veterinary care. In contrast, significant gaps were observed in their practical, hands-on first aid knowledge. Scores were alarmingly low for skills such as using charcoal to treat poisoning (0.10) and managing a bleeding wound (0.30). While they excelled at connecting farmers to professional services, these knowledge gaps suggested they were not equipped to provide immediate, life-saving interventions, which could negatively impact health of animals in critical situations. Standard CAHW training guidelines highlight that community animal health workers should possess essential practical competencies including basic treatment, follow-up care, record keeping, and emergency response under veterinary supervision (Annoymous, 2002c). Similar findings have been documented in studies on emergency preparedness, where it was found that, despite acceptable awareness of referral protocols and support systems, inadequate practical knowledge and insufficient hands-on training were major obstacles to effective emergency response (Abraham et al., 2023). The observed gaps therefore indicate a need for strengthened practical skill-based training and refresher capacity-building programmes.

Table 6: Mean scores on emergency and first aid skills (N=20)

Statement on vaccination and deworming	Mean score (correct)
Is charcoal an effective emergency treatment for poisoning in animals (Q45)	0.10
Do you have the emergency contact number of the veterinary doctor in your area (Q46)	1.00
Do you know how to handle a bleeding wound in an animal (Q47)	0.30
Do you refer very serious cases to a veterinarian immediately in your area (Q48)	0.90

3.7. Extension role and record-keeping

An analysis of *Pashusakhis* understanding of their extension role and record-keeping responsibilities revealed a clear discrepancy between their advisory and administrative proficiency. A strong awareness of their duty to inform farmers about crucial animal health practices was evident, as shown by a high mean score of 0.90 for advising on timely vaccinations and deworming (Table 7). This indicated a firm grasp of their role as a community-level resource and

Table 7: Mean scores on extension role and record-keeping (N=20)

Statements on extension role and record-keeping	Mean score (correct)
<i>Pashusakhis</i> should maintain health records of livestock (Q49)	0.35
Do you think it your job to tell farmers about timely vaccinations and deworming of their animals (Q50)	0.90

a conduit for essential health information. In stark contrast, a significant gap existed in their record-keeping skills. Despite receiving training, the mean score for maintaining health records was a strikingly low 0.35. This suggested, disconnect between theoretical knowledge and its practical application. Further qualitative findings corroborated this, indicating that the actual practice of record keeping was minimal, with many relying on family members or a spouse for assistance. This reliance on external support highlighted a critical challenge in the autonomous adoption of this administrative skill. While *Pashusakhis* understand their advisory role, the complexity or perceived difficulty of record keeping hinders their ability to apply this knowledge independently. Similar challenges have been reported by Yadav et al. (2025), regarding workforce capacity, training support, monitoring systems, and documentation practices as key factors influencing the successful implementation of preventive healthcare interventions. Proper record keeping was often under-valued at the grassroots level, though the *Pashusakhis* were trained to operate a mobile phone but they were not practicing it themselves rather taking assistance from their family members. Without systematic Record-keeping and health monitoring, their role as village level livestock extension worker becomes difficult.

The Present study align with the observations reported by Matos et al. (2026), particularly in the context of systemic challenges affecting Community Animal Health Workers (CAHWs) in India. Both studies highlighted that the absence of a uniform training curriculum, standardized certification, and formal legal recognition has led to inconsistencies in the competencies and service delivery of para-veterinary personnel across regions.

For consolidated understanding of knowledge gaps across different thematic domains, the findings from all thematic areas summarized in Table 8. The summary highlights domain wise weaknesses and strengths among *Pashusakhis*, enabling identification of priority training areas requiring targeted capacity-building interventions. The integrated analysis revealed that while *Pashusakhis* possessed satisfactory knowledge in preventive healthcare and advisory roles, substantial gaps existed in technically

Table 8: Summarized knowledge gap of pashusakhis by thematic area (N=20)

Thematic area	Lowest scoring items	Remarks
Basic healthcare and hygiene	It is not required to have a separate feeding and resting space for animals	Initial training was effective in preventive healthcare and hygiene, but a gap exists in more technical areas like animal housing.
Feeding and nutrition	Is it safe to feed urea directly to animals if mixed in small quantities with water Can feeding excess concentrate during late pregnancy increase the chances of kidding difficulties in goats	The <i>Pashusakhis</i> struggled with advanced feeding and nutrition practices, indicating training does not adequately cover complex nutritional management.
Disease management	Should you give antibiotics to animals without veterinary advice Do all infectious diseases spread only through direct animal-to-animal contact	Significant gaps exist in understanding responsible medication use and the spread of infectious diseases. Knowledge about specific high-risk diseases like PPR was insufficient.
Breeding and reproduction	Is silent heat a problem in heat detection in the case of buffalo Do you know how to estimate the age of animals by the dentition method	There is a low awareness of advanced reproductive physiology and foundational skills like age estimation. This may be partly due to gender-related barriers during training.
Vaccination and deworming	Should deworming in calves be started as early as 15 days of age Is cold storage not necessary to be maintained if a vaccine is used within the same day	Critical knowledge gaps were identified regarding early deworming protocols and vaccine storage.
Emergency and first aid	Is charcoal an effective emergency treatment for poisoning in animals Do you know how to handle a bleeding wound in an animal	While <i>Pashusakhis</i> were proficient in referring cases to veterinarians, they lack knowledge of practical, hands-on first aid for immediate interventions.
Extension and record-keeping	Pashusakhis should maintain health records of livestock Is record keeping important for heat detection, insemination, and predicting calving/kidding dates	Gap exists between understanding their advisory role and the practical application of documentation skills, with many relying on family for assistance.

intensive domains such as advanced nutrition management, reproductive health, vaccine handling, emergency first aid, and systematic record keeping. Addressing these gaps is critical, as improved livestock health knowledge and service delivery directly influence animal productivity, disease control, and rural livelihood outcomes. Similar observations were emphasized by Kappes et al. (2023), who reported that strengthening frontline animal health service capacity and improving technical competencies are essential components for enhancing livestock health outcomes and economic efficiency within smallholder production systems

4. CONCLUSION

While *Pashusakhis* effectively served as a brigade between frontline animal health service providers, notable knowledge gaps persisted in advanced nutrition, disease management, breeding, vaccination protocols, emergency care, and record-keeping. These deficiencies reflected broader inconsistencies in India's para-veterinary

training and recognition systems. The findings of the study highlighted for strengthening standardized, gender-inclusive curricula aligned with global animal healthcare guidelines was essential to enhance their technical competency, advisory capacity, and overall contribution to sustainable rural livestock healthcare delivery system.

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