Avian Metapneumovirus (aMPV) in the United States:
Awareness, Biology, and Control—Lessons Learned, 2023–2026

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Executive Summary

Avian metapneumovirus (aMPV) subtypes A and B emerged as major U.S. poultry-health challenges beginning in late 2023. What initially appeared to be a regional respiratory disease rapidly became a national diagnostic, regulatory, vaccination, and production-management challenge. Turkeys experienced the earliest and most dramatic impact, although broilers, breeders, and layers were also affected. Clinical severity reflected both direct respiratory epithelial injury and secondary bacterial disease following loss of mucociliary clearance.

The response developed while the disease event was still unfolding. Diagnostic assays were being developed, sampling strategies refined, surveillance networks expanded, vaccine permits evaluated, and field vaccination programs implemented simultaneously. In many respects, the industry was "building an airplane while it was already flying"— responding urgently while scientific, regulatory, and operational questions were still being answered.

Key Messages

- Rapid geographic spread and severe respiratory disease made aMPV a major production and animal-health concern.
- Secondary bacterial infections — especially colibacillosis — frequently magnify clinical disease and mortality.
- Reliable diagnosis requires alignment of flock history, lesions, sampling quality, PCR, and, when needed, sequencing and ancillary testing.
- Vaccination became an important tool, but application quality, timing, field pressure, management, and bacterial disease influenced outcomes.
- Continued surveillance, virus characterization, integrated control, and collaboration remain essential.

Historical Context

For the broader chronology of aMPV emergence and key global events, see Table 2 in Anil et al. (2026). That timeline provides the historical framework for the U.S. experience summarized here, from earlier international recognition and U.S. subtype C events to the recent emergence of subtypes A and B.

Recognition to Response

The first recognized diagnoses of the current U.S. subtype A and B event occurred in late 2023 and early 2024. Retrospective serology presented at AAAP 2026 suggests subtype B exposure may have preceded the recognized outbreak. As testing expanded, the apparent geography expanded as well; maps therefore reflect both viral spread and improving diagnostic awareness.

Field reports of respiratory disease, swollen heads, secondary colibacillosis, increased mortality, reduced intake, and egg production losses created urgency. Producers, veterinarians, laboratories, researchers, industry, and USDA worked in parallel on diagnosis, communication, regulatory access, vaccination, and continued surveillance.

The U.S. response was not sequential—diagnosis, communication, regulation, vaccination, and surveillance developed in parallel.

Biology, Field Disease, and Diagnostic Confidence

Biology That Explains the Field Disease

aMPV spreads efficiently through susceptible poultry populations by respiratory and close-contact routes, with operational risk associated with movement of personnel, equipment, and air. Viral replication and inflammation damage respiratory cilia, impair mucociliary clearance, and weaken local defenses. Secondary pathogens—especially Escherichia coli—can then amplify disease. This explains why ventilation, stocking density, bacterial pressure, immune status, and concurrent infections influence severity.

Building Diagnostic Confidence

Clinical signs raise suspicion; laboratory confirmation establishes the diagnosis. No single result should be interpreted in isolation. Confidence is greatest when flock history, disease pattern, mortality, necropsy findings, targeted sampling, PCR, pathology, bacteriology, and—when appropriate—virus isolation or sequencing tell a consistent story.

- Select actively affected, recently symptomatic birds rather than only moribund end-stage birds.
- Sample early and before extensive treatment whenever possible.
- Use appropriate respiratory sampling sites and provide vaccination date, product, route, clinical timeline, and treatment history.
- Match the test to the question: detection, tissue injury, viable virus, exposure, subtype, vaccine differentiation, or characterization.

Diagnostics: From Detection to Characterization

Early questions focused on whether aMPV was present and which subtype was involved. Vaccination added new questions: Is PCR detecting vaccine or field virus? Is the virus changing? Can sequence information support epidemiology? Diagnostic capacity expanded across university, government, commercial, and industry laboratories.

DIVA and Full-Length G-Gene Sequencing

DIVA includes more than one approach. Vaccine-specific real-time RT-qPCR asks whether the detected virus matches a known vaccine strain. A positive result supports detection of that vaccine strain; a negative vaccine-specific assay, when another aMPV assay is positive, supports that the detected virus is not the tested vaccine strain.

The Iowa State University approach is different. Nested RT-PCR amplifies the full-length G gene of subtype A and/or B, followed by Sanger sequencing, percent-similarity comparison, and phylogenetic analysis. Because sequence differences between available live vaccines and U.S. wild-type viruses are distributed across the full G gene, this method can distinguish vaccine from wild-type virus while also identifying lineage and genetic change. Vaccine-specific qPCR and full-length G-gene sequencing are complementary tools designed to answer different diagnostic questions.

Vaccination, Collaboration, and the Next Phase

Vaccination: Availability, Application, and Evaluation

USDA CVB authorization of vaccine import permits provided an important additional control tool. Field programs commonly used hatchery vaccination followed by a field booster in longer-lived turkey programs, with spray or drinking-water application depending on production system and logistics. No single schedule was appropriate for every company or region.

- Maintain viability through proper storage, handling, dilution, water quality, and equipment preparation.
- Deliver a full dose and obtain broad flock coverage using sufficient volume and appropriate droplet size.
- Keep birds calm; manage fans and ventilation during spray application and restore ventilation promptly.
- Use PCR as the primary vaccine-take measure, commonly around 4–7 days post-vaccination when appropriate for the assay and program.
- Evaluate both process measures and outcomes, including improved livability and reduced clinical disease under field challenge.

PCR-confirmation of vaccine takes has not been consistent, but continues to be a tool, while serology did not reliably correlate with PCR take. The broader lesson is that delivery method and application quality must be evaluated rather than assumed.

A perfectly good vaccine can perform poorly if it is applied poorly.

Collaboration Accelerated Learning

The ad hoc aMPV Working Group began in late December 2023 as colleagues asked, “Are you seeing this too?” It grew to more than 200 participants across production, diagnostics, academia, trade associations, government, allied industry, and international poultry health. Regular communication identified recurring patterns, diagnostic gaps, research needs, and regulatory priorities. No single organization had all the answers, but the network assembled a more complete picture.

Where Do We Go from Here?

- Continued surveillance for new field signals and geographic change.
- Evolving diagnostics that improve differentiation, interpretation, and access.
- Virus characterization linking genetic change with epidemiology and disease expression.
- Integrated control combining vaccination, diagnostics, biosecurity, ventilation, bacterial control, and management.
- Continued collaboration to preserve the network before the next emergency.

Whole-genome sequencing presented at AAAP 2026 identified a new North Carolina-associated subtype A variant and subtype A and B lineages closely aligned with imported vaccine strains.

These findings indicate that the U.S. viral population is no longer defined only by the highly conserved strains observed during the initial emergence.

Selected References

- Anil A, Ghimire B, Bhandari M, Yadav KK. Avian Metapneumovirus: Current Knowledge, Critical Gaps, and Future Directions in Transmission, Pathogenesis, and Control Across Poultry Systems. Viruses. 2026;18(7):781. See Table 2.
- Sharafeldin T, Mor S. Emergence of new variants of aMPV subtypes A and B circulating in U.S. poultry. AAAP 2026.
- El-Gazzar M. Full-length G-gene sequence typing for differentiation of wildtype from live attenuated vaccine. AAAP 2026.
- Markis M. Retrospective serological evaluation of U.S. aMPV exposure prior to 2024. AAAP 2026.
- Freeman N. Spray or gel? Hatchery application method and aMPV vaccine take in turkey poults. AAAP 2026.

Emerging diseases are inevitable. Working together is a choice.

ACKNOWLEDGEMENTS

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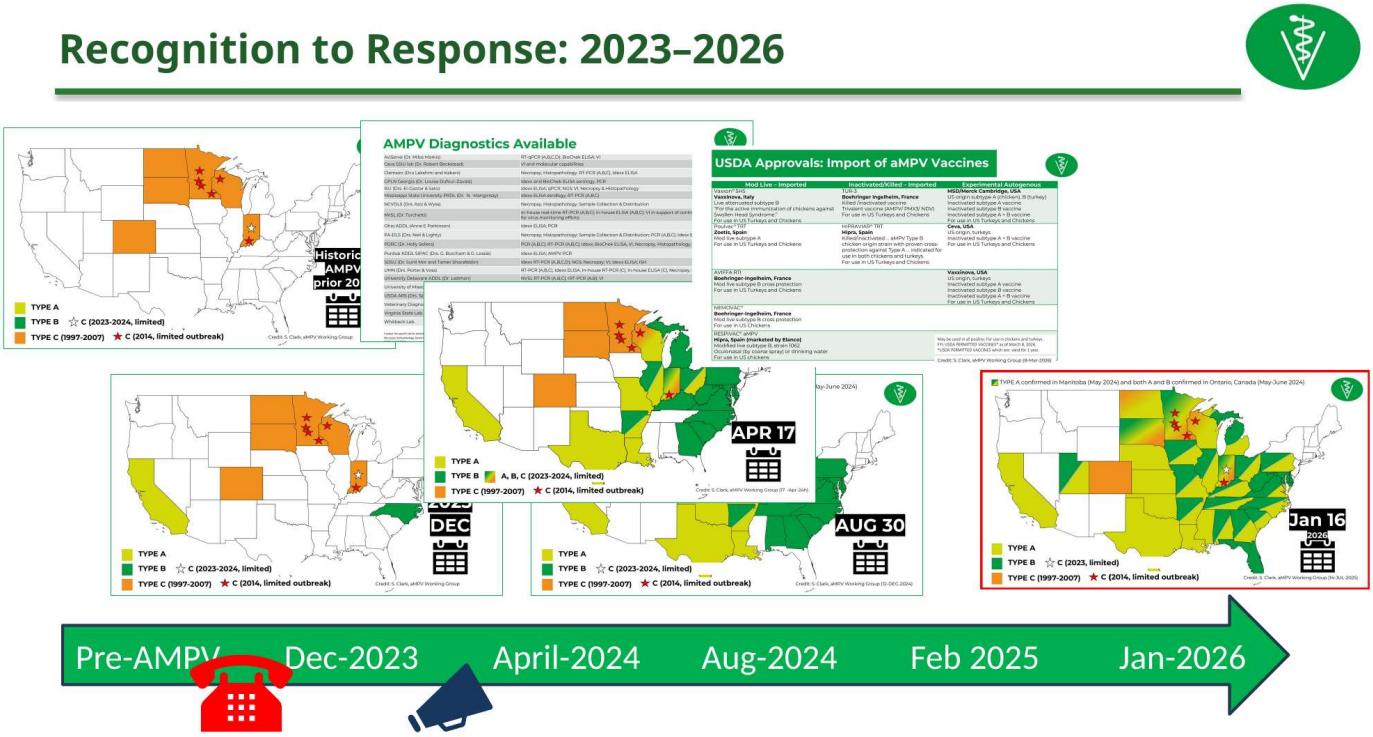
The poultry industry gratefully acknowledges the USDA Center for Veterinary Biologics (CVB) for its timely regulatory response during the emergence of avian metapneumovirus in the United States. The authorization of imported modified-live vaccines, imported inactivated (killed) vaccines, and U.S. experimental autogenous vaccines expanded the tools available to veterinarians and producers responding to this unprecedented disease challenge.

Figure 1. Recognition to Response: 2023–2026

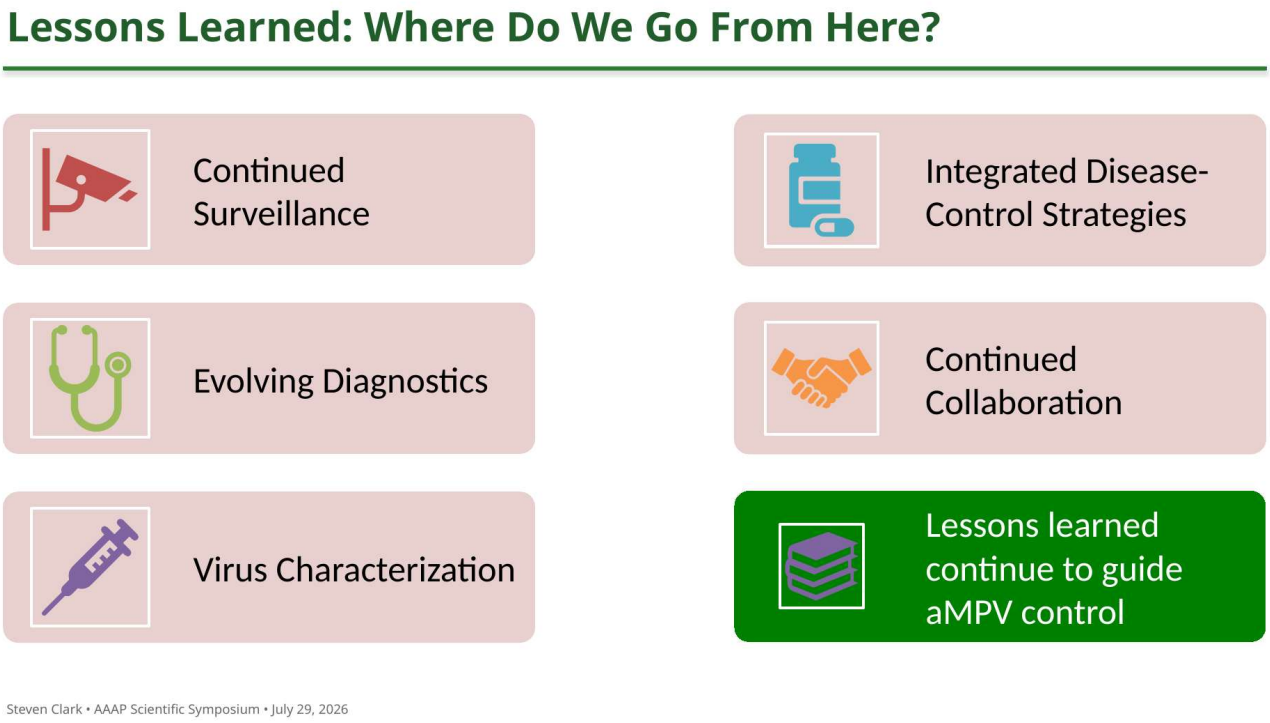
Recognition, diagnostic expansion, regulatory action, vaccination, and surveillance developed as overlapping workstreams.



Source: AAAP 2026 presentation by Steven Clark, DVM, ACPV.

Figure 2. Lessons Learned: Where Do We Go from Here?

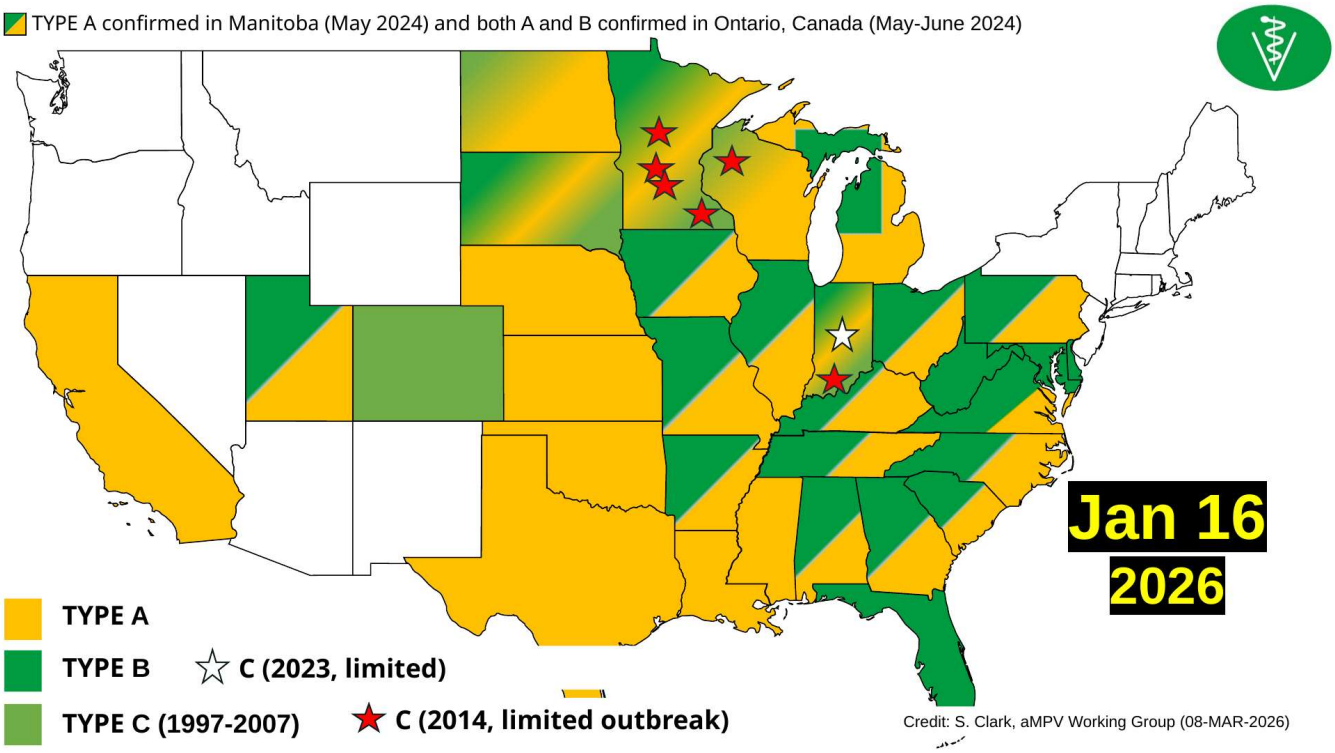
Durable priorities include surveillance, evolving diagnostics, virus characterization, integrated control, and continued collaboration.



Source: AAAP 2026 presentation by Steven Clark, DVM, ACPV.

Addendum A. Map of aMPV cases in poultry.

This map reflects reported U.S. and Canadian subtype A and B recognition through January 2026, together with selected historical subtype C events. Absence of shading should not be interpreted as proof of absence; diagnostic access, sampling, and reporting changed over time.



Credit: S. Clark, ad hoc aMPV Working Group. Map as presented at AAAP 2026.

Addendum B. Diagnostic Laboratory Reference Table

This practical reference reflects capabilities reported during preparation of the AAAP 2026 presentation. Services, contacts, assay availability, submission requirements, and regulatory conditions can change; confirm directly with the laboratory before submission.

Diagnostic Capacity Expanded Rapidly

Addendum Available Upon Request

Lab	Contact	Necropsy/ Histopath	ELISA	PCR	Other
Alabama AVDL, Auburn, AL	Walz	Yes	Idexx	Yes	
AviServe, DE	Markis		BioChek, Idexx	RT-qPCR	VI, VN
Boehringer-Ingelheim	Dougherty-McComb			Yes	
Ceva	Sellers			Yes	VI
Clemson, SC	Lakshmi & Kakani	Yes	Idexx	Yes	
Elanco	Gustin			Yes	
GPLN, GA	Dufour-Zavala	Yes	BioChek, Idexx	Yes	
ISU, IA	El-Gazzar, Sato, Carnaccini	Yes	Idexx	DIVA RT-PCR+G-gene	VI, VN, NGS, WGS
MSU PRDL, MS	N. Manginsay	Yes	Idexx	Yes	
MU VMDL	McAdams & Uprety	Yes	Idexx	Yes	NGS, WGS
NC VDL – Rollins, NC	Trybus	Yes	Idexx	Yes	
NVSL, Ames, IA	Torchetti		NVSL	RT-qPCR	VI
OSU ADDL, OH	Parkinson	Yes	Idexx	Yes	
PADLS, PA	Niel & Lighty	Yes	Idexx	Yes	
PDRC, UGA GA	Raccoursier & Chrzastek	Yes	BioChek, Idexx	DIVA RT-qPCR+WGS	VI, NGS, WGS
Purdue ADDL SIPAC, IN	Burcham & Lossie	Yes	Idexx	Yes	
SDSU, SD	Mor & Sharafeldin	Yes	Idexx	Yes	VI, NGS, ISH
Texas TVMDL, TX	Hensley	Yes	Idexx	Yes	VI
UD ADDL, DE	Ladman	Yes		Yes	VI
UMN, MN	Rovira & Patnayak	Yes	Idexx	Yes	VI, NGS
USDA SEPRL ARS	Kapczynski & Spackman			Yes	VI, NGS
VA-Harrisonburg	Quercia	Yes	Idexx		
Vaxxinova	Ortega-Heinly			DIVA RT-qPCR	
VDP, NC	Clontz	Yes	BioChek	Yes	VI
Whitbeck Lab, AR	Whitbeck		BioChek	Yes	
Zoetis	Shepherd			DIVA RT-qPCR	

Rapid expansion of diagnostic capacity converted scattered field observations into a national picture.

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Compiled by S. Clark and the ad hoc aMPV Working Group for AAAP 2026.

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Addendum C. DIVA Diagnostic Approaches for Avian Metapneumovirus

aMPV DIVA Diagnostic Approaches: Vaccine-Specific qPCR vs. G-Gene Sequencing

Feature	Vaccine-Specific qPCR	Full Length G-Gene Sequencing
Diagnostic Method	Vaccine-strain-specific qPCR	PCR + G-gene sequencing
Primary Purpose	**Detect vaccine virus**	**Differentiate vaccine and field viruses through genetic characterization**
Positive Result	Vaccine strain detected	Sequence identifies virus lineage/strain
Negative Result	Suggests detected virus is not vaccine strain (likely field virus)	Requires sequence comparison for interpretation
Field Virus Identification	Indirect	Direct genetic characterization
Genetic Information	Limited	Extensive
Detect Emerging Variants	No	Yes
Supports Epidemiology	Limited	Strong
Best Application	Routine diagnostic **differentiation**	Surveillance, outbreak investigation, viral evolution **monitoring**

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Addendum D. USDA-CVB Approved aMPV Vaccines for Use in the U.S.

USDA-CVB Permitted aMPV Vaccines

Mod Live – Imported	Inactivated/Killed – Imported	Experimental Autogenous
Vaxxon® SHS **Vaxxinova, Italy** Live attenuated subtype B (turkey origin) "For the active immunization of chickens against Swollen Head Syndrome." For use in US Turkeys and Chickens	TUR-3 **Boehringer Ingelheim, France** Killed /inactivated vaccine Trivalent vaccine (AMPV/ PMX3/ NDV) For use in US Turkeys and Chickens	**MSD/Merck Cambridge, USA** US origin subtype A (chicken), B (turkey) Inactivated subtype A vaccine Inactivated subtype B vaccine Inactivated subtype A + B vaccine For use in US Turkeys and Chickens
Poulvac® TRT **Zoetis, Spain** Mod live subtype A (turkey origin) For use in US Turkeys and Chickens	HIPRAVIAR® TRT **Hipra, Spain** Killed/inactivated … aMPV Type B chicken origin strain with proven cross-protection against Type A … indicated for use in both chickens and turkeys. For use in US Turkeys and Chickens	**Ceva, USA** US origin, turkeys Inactivated subtype A + B vaccine For use in US Turkeys and Chickens
AVIFFA RTI **Boehringer-Ingelheim, France** Mod live subtype B cross protection (turkey origin) For use in US Turkeys and Chickens		**Vaxxinova, USA** US origin, turkeys Inactivated subtype A vaccine Inactivated subtype B vaccine Inactivated subtype A + B vaccine For use in US Turkeys and Chickens
NEMOVAC® **Boehringer-Ingelheim, France** Mod live subtype B cross protection (chicken origin, strain PL21) For use in US Chickens		
RESPIVAC® aMPV **Hipra, Spain (marketed by Elanco)** Modified live subtype B, strain 1062 (chicken origin) Oculonasal (by coarse spray) or drinking water For use in US chickens		

USDA-CVB permitted products shown as of June 2026.Information compiled from USDA-CVB permits and manufacturer communications.

Credit: S. Clark, aMPV Working Group