Drilling down on the bird flu response

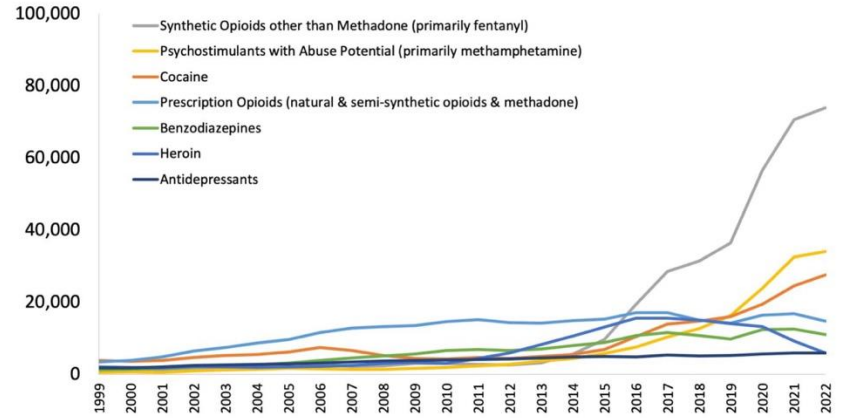
Meryl Nass, MD

The response to avian influenza was crafted when it was thought to cause 50% mortality in humans. But the rate in humans for current H5N1 strains is 1.4% and it is rare

- **It is clearly time for a whole new look!**
- The USG has spent ~$2 Billion in 2 years to manage a **theoretical future risk of human-to-human transmission**, while we have so many **real risks** to be managed, for example, drug overdose deaths that have skyrocketed during the past twenty years.
- Since avian flu in humans was discovered in 1997, no human-human transmission has been documented
- How likely is it to mutate to become both virulent and transmissible to humans outside a GOF lab?

https://nida.nih.gov/research-topics/trends-statistics/overdose-death-rates#Fig2

Figure 2. U.S. Overdose Deaths*, Select Drugs or Drug Categories, 1999-2022



*Includes deaths with underlying causes of unintentional drug poisoning (X40–X44), suicide drug poisoning (X60–X64), homicide drug poisoning (X85), or drug poisoning of undetermined intent (Y10–Y14), as coded in the International Classification of Diseases, 10th Revision. Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999-2022 on CDC WONDER Online Database, released 4/2024.

Make the response commensurate with the risk

Reasons why old bird flu response won't work

You cannot expunge avian influenza in wild birds

- "In birds, avian influenza viruses are shed in the feces and respiratory secretions. They can all be spread through direct contact with secretions from infected birds, especially through feces or through contaminated feed and water. Because of the resistant nature of avian influenza viruses, including their ability to survive for long periods when temperatures are low, they can also be carried on farm equipment and spread easily from farm to farm."
- https://www.woah.org/en/disease/avian-influenza/

World Organisation for Animal Health

Airborne transmission is possible, including from the dust generated after culling

https://www.cidrap.umn.edu/avian-influenza-bird-flu/can-avian-flu-spread-wind-cant-be-ruled-out-experts-say
https://www.biorxiv.org/content/10.1101/2025.02.12.637829v1

Experts are doubtful biosecurity measures will be effective

Several experts quoted by STAT in different stories say the same thing, for example:

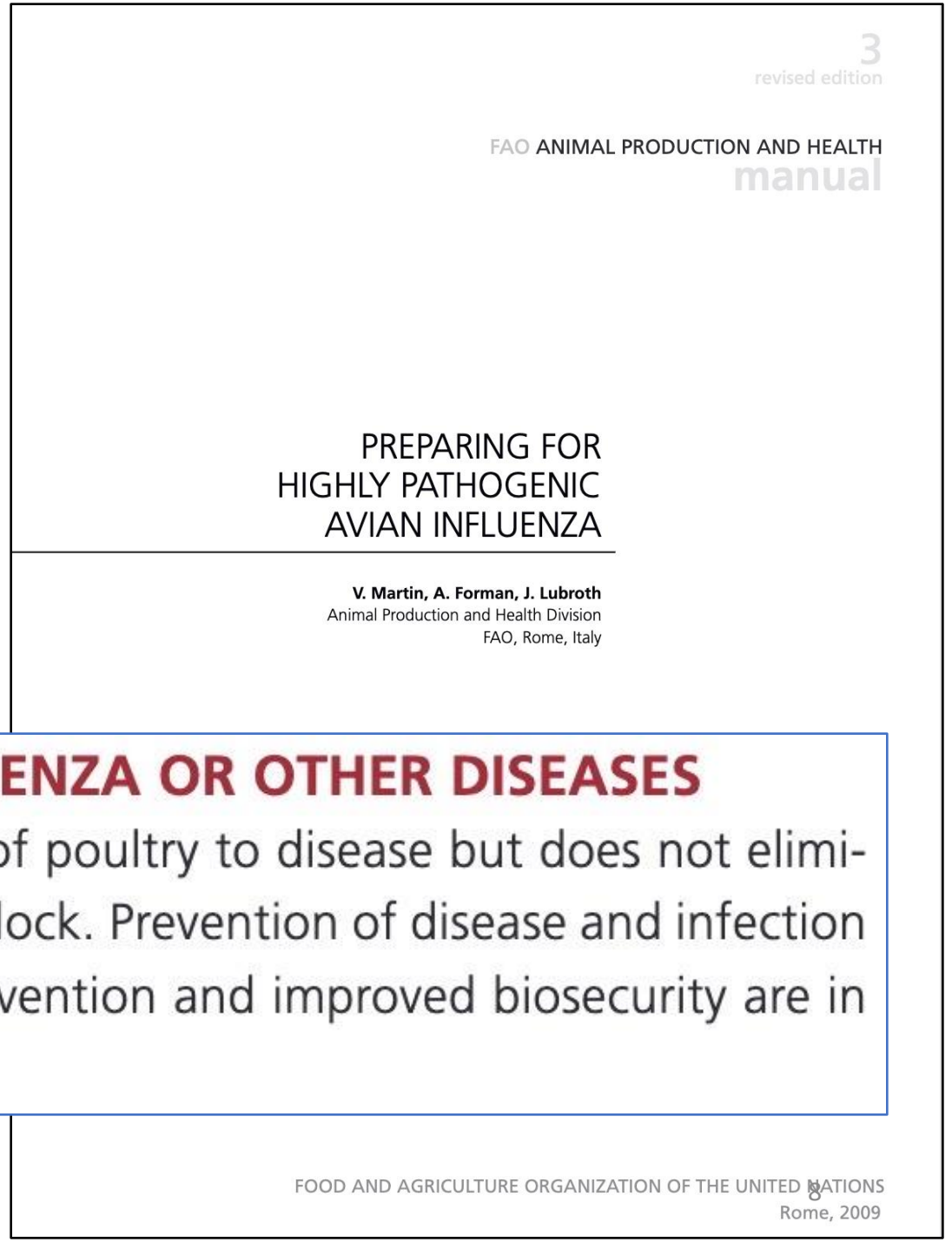
> "While some farmers may have been less strict" in following USDA precautions to prevent the spread of H5N1, **"I personally know a fair number of producers that pulled out all the stops, followed every suggestion, came up with novel protections of their own,"** Mike Payne, a food animal veterinarian and biosecurity expert with the University of California, Davis' Western Institute for Food Safety and Security, told STAT in an email. **"They still got infected and were enormously disheartened and frustrated."**

https://www.statnews.com/2024/12/20/california-h5n1-bird-flu-emergency-declaration-avian-flu-spread-dairy-cattle/

More Facts on Bird Flu

The UN's Food and Agriculture Organization published its first plan for bird flu in **2009, noting that vaccinating chickens does not eliminate the disease**

https://www.fao.org/4/i0808e/i0808e.pdf



3
revised edition

FAO ANIMAL PRODUCTION AND HEALTH
manual

PREPARING FOR
HIGHLY PATHOGENIC
AVIAN INFLUENZA

V. Martin, A. Forman, J. Lubroth
Animal Production and Health Division
FAO, Rome, Italy

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, 2009

5.7 VACCINATION AGAINST AVIAN INFLUENZA OR OTHER DISEASES

Vaccination, in general, increases the resistance of poultry to disease but does not eliminate the possibility that infection may occur in a flock. Prevention of disease and infection can be accomplished only if other aspects of prevention and improved biosecurity are in place.

Nearly all cases have been mild

The NEW ENGLAND JOURNAL of MEDICINE

Highly Pathogenic Avian Influenza A(H5N1) Virus Infections in Humans

Authors: Shikha Garg, M.D., Katie Reinhart, Ph.D., Alexia Couture, M.P.H., Krista Kniss, M.P.H., C. Todd Davis, Ph.D., Marie K. Kirby, Ph.D., Erin L. Murray, Ph.D., +26, and Sonja J. Olsen, Ph.D. Author Info & Affiliations

Published December 31, 2024 | N Engl J Med 2025;392:843-854 | DOI: 10.1056/NEJMoa2414610

"Of 46 case patients, 20 were exposed to infected poultry, 25 were exposed to infected or presumably infected dairy cows, and 1 had no identified exposure; that patient was hospitalized with nonrespiratory symptoms, and A(H5N1) virus infection was detected through routine surveillance. Among the 45 case patients with animal exposures, the median age was 34 years, and all had mild A(H5N1) illness; none were hospitalized, and none died. A total of 42 patients (93%) had conjunctivitis, 22 (49%) had fever, and 16 (36%) had respiratory symptoms; 15 (33%) had conjunctivitis only. The median duration of illness among 16 patients with available data was 4 days (range, 1 to 8)."

https://www.nejm.org/doi/full/10.1056/NEJMoa2414610

We don't know the full scope of the problem—how many survive and keep laying? We only know the cull #s:

Leaders of the Congressional Chicken Caucus said in a letter to Rollins last week that while the egg industry has lost the most birds, the broiler industry could bear a disproportionate share of the costs of any policy change. According to USDA figures 77.5% of the nearly 159 million commercial birds lost to avian influenza since February 2022 have been **layers, or over 123 million**. That compares to **13.7 million broilers**, or 8.6%, and **18.7 million turkeys**, or 11.8%.

https://www.wsav.com/news/ap-health/ap-as-egg-prices-soar-trump-administration-plans-new-strategy-to-fight-bird-flu/

As of January 1, 2025, farmers would not be reimbursed for culls unless they used prescribed biosecurity measures

- Biosecurity measures have usually been ineffective
- USDA's Rollins proposed to pay (only) up to 75% of costs of biosecurity measures and provide free consulting to commercial egg farms https://www.wsj.com/opinion/agriculture-secretary-brooke-rollins-my-plan-to-lower-egg-prices-6be0f881
- The biosecurity measures recommended by APHIS fail to prevent wild birds spreading to domestic flocks/herds with outdoor access. https://www.aphis.usda.gov/sites/default/files/sample-biosecurity-checklist.pdf
- Even enclosed chickens have been infected near ventilation inlets, presumably from airborne spread of virus. Wild birds can enter many chicken barns. https://www.biorxiv.org/content/10.1101/2025.02.12.637829v1

Bird flu is not a food-borne illness, per CDC and USDA

https://www.cdc.gov/bird-flu/media/pdfs/2024/07/avian-flu-transmission.pdf

infections in people are rare, but possible. Most reported bird flu
ons in people have happened after unprotected contact with infected
r contaminated surfaces. This fact sheet provides information about
and bird flu infections in people.

Flu in Wild Birds

ter birds (like ducks and geese) can be infected with avian (bird)
a (flu) viruses, but usually do not get sick. Infected birds have virus in
liva, mucous and droppings (feces). Bird flu viruses can spread easily
n birds. Some of these viruses can cause serious illness and death in
ic poultry (like chickens, ducks, and turkeys).

Flu in Poultry

icated birds (chickens, turkeys, ducks, etc.) can become infected with
A viruses through direct contact with infected waterfowl or other infected
or through contact with surfaces that have been contaminated with
ses. Bird Flu is a serious poultry disease and requires rapid response
e it is highly contagious and can be fatal to chickens. Animal and Plant
nspection Service (APHIS) works with its federal, state, local and industry
s to quickly respond to any bird flu findings, including bird flu A(H5) or
rus outbreaks in poultry, where depopulation (or culling, also called
ing out") of infected flocks is usually carried out.

Flu in People

e for people to get infected with bird flu viruses, but it can happen. Bird
es can infect people when enough virus gets into a person's eyes, nose,
h, or is inhaled. This might happen when virus is in the air (in droplets or
/ dust) and a person breathes it in, or when a person touches something
s virus on it and then touches their mouth, eyes or nose. (See picture
rse side.) Most bird flu infections in people have happened after close,
prolonged, unprotected contact with infected birds or contaminated surfa
People who are sick with bird flu virus infection can be treated with the s
prescription drugs that are used to treat people who are sick from huma
seasonal flu virus infection. People who have had no contact with infecte
poultry or contaminated surfaces are thought to be at very low risk of inf
People with close, prolonged, unprotected exposure with infected birds o
contaminated environments are thought to be at greater (though probab
low) risk of infection.

No human bird flu infections have been reported from proper handling of
meat or from eating properly cooked poultry or poultry products.

Bird Flu Outbreaks in Birds

Outbreaks of bird flu happen among birds from time to time. When bird fl
outbreaks happen in U.S. poultry, the United States Department of Agric
(USDA) works with industry, state and other government partners to stop
outbreak so that it does not spread to other poultry. Surveillance of flock
are nearby or linked to the infected flock(s) and quarantine of exposed f
with culling if disease is detected, are the preferred control and eradicat
methods. The Centers for Disease Control and Prevention works with pa
to protect the public's health during these outbreaks. The risk to the pub
bird flu outbreaks is low; however, because other bird flu viruses have inf
people, it is possible that human infections with these viruses could occ

Cal-Maine Foods

Cal-Maine Foods Reports Results for Second Quarter Fiscal 2025

January 7, 2025 at 4:05 PM EST

RIDGELAND, Miss.--(BUSINESS WIRE)--Jan. 7, 2025-- Cal-Maine Foods, Inc. (NASDAQ: CALM) ("Cal-Maine Foods" or the "Company"), the largest producer and distributor of fresh shell eggs in the United States, today reported results for the second quarter of fiscal 2025 (thirteen weeks) ended November 30, 2024.

Second Quarter Fiscal 2025 Highlights

- Quarterly net sales of $954.7 million
- Quarterly net income of $219.1 million, or $4.47 per diluted share
- Quarterly record for total dozens sold and specialty dozens sold
- Cash dividend of approximately $73.0 million, or approximately $1.49 per share, pursuant to the Company's established dividend policy

Overview

Sherman Miller, president and chief executive officer of Cal-Maine Foods, stated, "Cal-Maine Foods delivered a very strong financial and operating performance in the second quarter of fiscal 2025. Robust demand for shell eggs resulted in a significant increase in dozens sold for the quarter, which included the seasonal boost leading up to the Thanksgiving holiday and sales from our latest acquisition completed in June. Our results also reflect higher market prices, which have continued to rise this fiscal year as supply levels of shell eggs have been restricted due to recent outbreaks of highly pathogenic avian influenza ("HPAI"). Our team did an outstanding job in managing our production as well as making outside purchases in order to meet the needs of our valued customers. We were fortunate to have the ability to leverage our significant scale and benefit from recent acquisitions, which have helped support our production capacity in this challenging supply environment.

"As demand continues to outpace supply, we remain focused on making additional strategic investments to expand our operations. We currently have approximately $60 million in new capital projects directed to the expansion of our cage-free capacity, including the $40 million in projects that we announced in October. The projects include the addition of five new cage-free layer houses and two pullet houses across the Company's locations in Florida, Georgia, Utah and Texas. Upon completion, we expect the projects to provide additional production capacity for approximately 1.1 million cage-free layer hens and 250,000 pullets by late summer 2025. We are also investing $15 million to expand our egg products processing facility in Blackshear, Georgia, to add extended shelf-life liquid egg products. We expect our processing plant and hatchery in Dexter, Missouri, that we acquired and repurposed for use in shell egg production, will be online in our next fiscal quarter. We have been working with local contract growers and have commitments for approximately 1.2 million additional free-range hens by fall 2025.

"Acquisitions and joint ventures have complemented our strong organic growth and provided new market opportunities for Cal-Maine Foods. We will continue to focus on acquiring operations that align with our strategic objectives, looking at critical factors including geographic relevance, operating synergies, product portfolio expansion, proximity to customers and potential financial returns. Our growth strategy is also focused on the expansion of our egg products offerings, including hard-cooked eggs from our MeadowCreek operations and other ready-to-eat products offered through our previously announced strategic investment in Crepini, which includes egg wraps, protein pancakes, crepes and wrap-ups in our product portfolio. Importantly, we have a strong balance sheet and the financial flexibility to make the right investments to support our growth strategy," added Miller.

Sales Performance & Operating Highlights

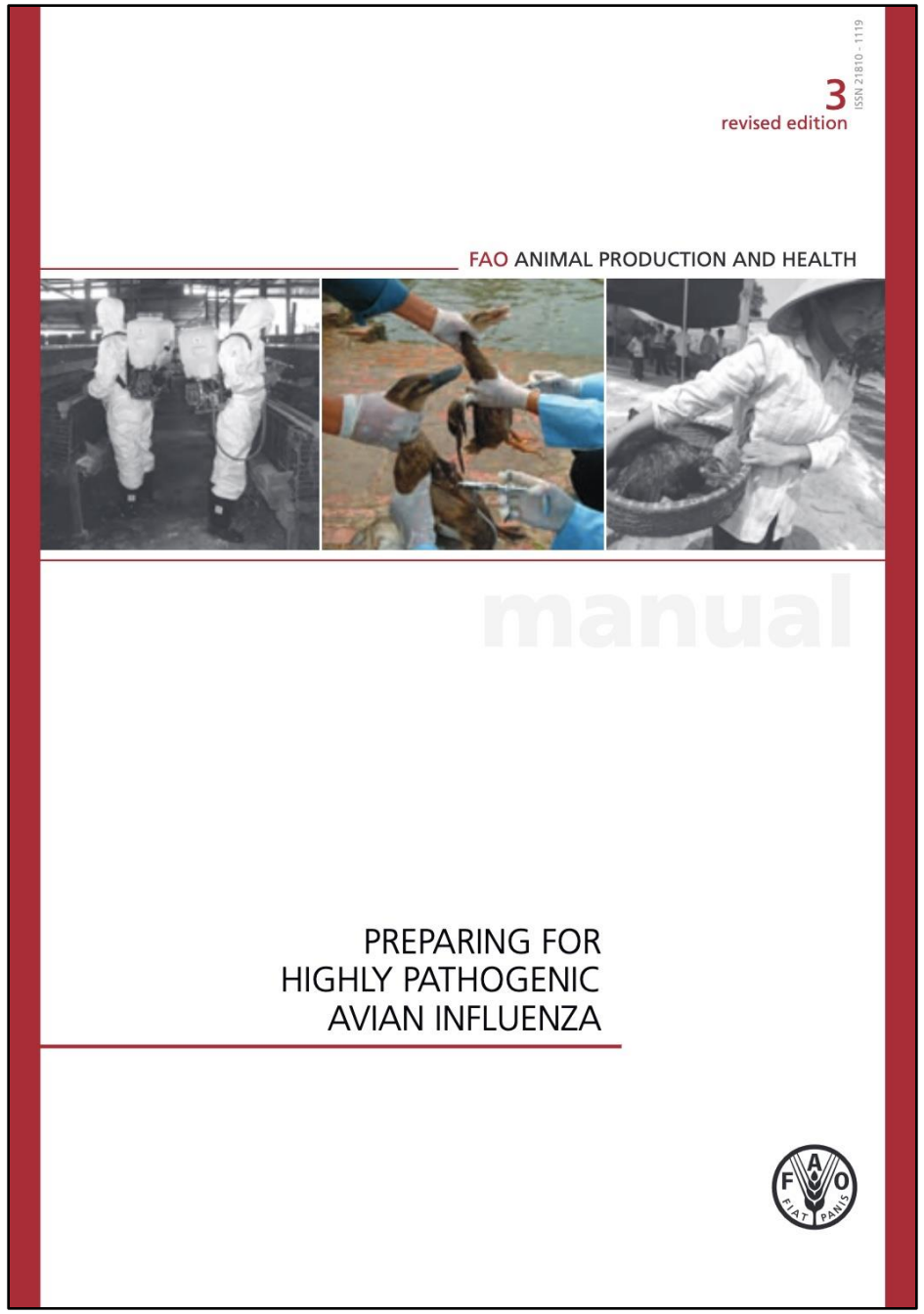
Max Bowman, vice president and chief financial officer of Cal-Maine Foods, added, "For the second quarter of fiscal 2025, our net sales were $954.7 million compared with $523.2 million for the same period last year. The higher sales were primarily driven by an increase in the net average selling price of shell eggs as well as an increase in total dozens sold.

"For the second fiscal quarter, we sold 329.8 million dozens shell eggs compared with 288.2 million dozens for the second quarter of fiscal 2024. Sales of conventional eggs totaled 209.6 million dozens, compared with 192.5 million dozens for the prior-year period, an increase of 8.9%. We saw over 25% quarterly growth in our specialty egg volumes as sales totaled 120.2 million dozens sold for the second quarter of fiscal 2025 compared with 95.7 million dozens sold for the prior-year period.

"Net income attributable to Cal-Maine Foods for the second quarter of fiscal 2025 was $219.1 million, or $4.47 per diluted share, compared with $17.0 million, or $0.35 per diluted share, for the second quarter of fiscal 2024.

"Overall, our second quarter farm production costs per dozen were 8.5% lower compared to the prior-year period, primarily due to more favorable commodity pricing for key feed ingredients. For the second quarter of fiscal 2025, feed costs per dozen were down 12.8% compared with the second quarter of fiscal 2024. Our costs for outside egg purchases increased significantly quarter-over-quarter, primarily due to higher shell egg prices and the increased dozens of shell eggs we purchased for customers during the higher seasonal demand cycle while the nation experienced lower supply due to HPAI.

"Current indications for corn and soybean supply project a favorable stocks-to-use ratio similar to today's prevailing levels for the remainder of fiscal



UN Food and Agriculture Organization

2009

- "Avian influenza is caused by influenza viruses that are **common in wild birds** and occasionally infect poultry.
- **When poultry are infected, they may have no disease, mild disease or very severe disease.**
- Chickens, quail and turkeys are especially susceptible, while ducks more commonly show no disease but act as a reservoir for the virus.
- Other poultry species, including guinea fowl and pheasants, and also ostriches, can become affected.
- While wild birds are generally not affected by the AI viruses that they carry, they can occasionally suffer disease."
- https://www.fao.org/4/i0808e/i0808e.pdf

J Wildl Dis. 2012 Jul;48(3):669-75. doi: 10.7589/0090-3558-48.3.669.

Surveillance of avian influenza viruses in migratory birds in Egypt, 2003–09

Atef Soliman [1], Magdi Saad, Emad Elassal, Ehab Amir, Chantal Plathonoff, Verina Bahgat, Maha El-Badry, Lu'ay S Ahmed, Mostafa Fouda, Mohammed Gamaleldin, Nahed Abd-Elal Mohamed, Stephanie Salyer, Claire Cornelius, Robert Barthel

Affiliations — collapse

Affiliation

1 US Naval Medical Research Unit Number 3, 3A Imtidad Ramses St., Abassia, Cairo, Egypt. atef.soliman.ctr.eg@med.navy.mil

- During September 2003-February 2009, the US Naval Medical Research Unit Number 3, Cairo, Egypt, in collaboration with the Egyptian Ministry of Environment, obtained cloacal swabs from 7,894 migratory birds captured or shot by hunters in different geographic areas in Egypt.
- Of the 7,894 samples, 745 **(9.4%)** were positive for the influenza A matrix gene
- **No major die-offs or sick migratory birds** were detected during the study.

https://pubmed.ncbi.nlm.nih.gov/22740532/

Has anyone died DUE TO bird flu? Reporting is vague

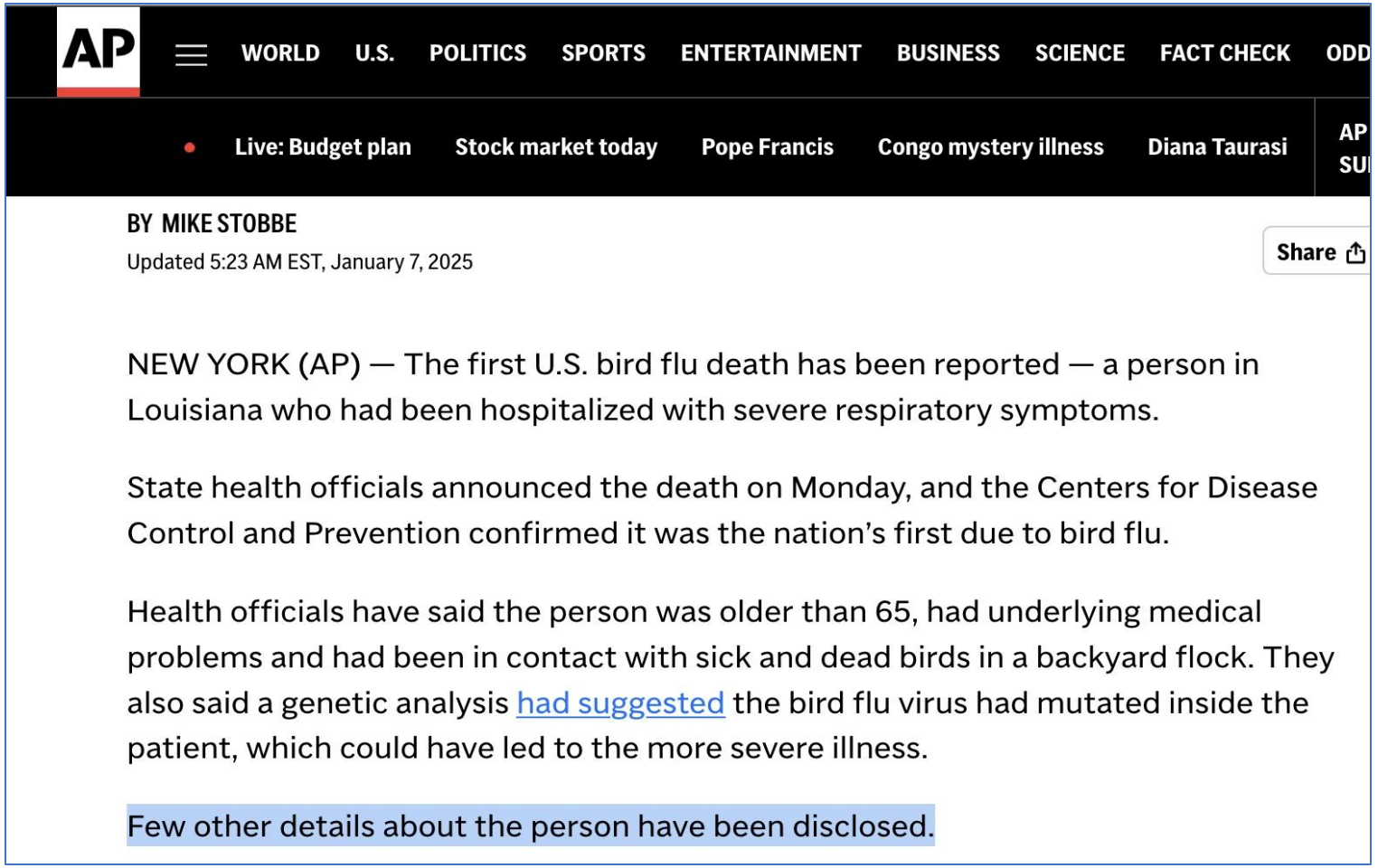
LDH reports first U.S. H5N1-related human death

Current general public health risk remains low

January 06, 2025

The Louisiana Department of Health reports the patient who had been hospitalized with the first human case of highly pathogenic avian influenza (HPAI), or H5N1, in Louisiana and the U.S. has died. The patient was over the age of 65 and was reported to have underlying medical conditions. The patient contracted H5N1 after exposure to a combination of a non-commercial backyard flock and wild birds.

AP: Few details were disclosed about the one death associated with bird flu or 5 hospitalized patients



AP

WORLD U.S. POLITICS SPORTS ENTERTAINMENT BUSINESS SCIENCE FACT CHECK ODD

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BY MIKE STOBBE

Updated 5:23 AM EST, January 7, 2025

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NEW YORK (AP) — The first U.S. bird flu death has been reported — a person in Louisiana who had been hospitalized with severe respiratory symptoms.

State health officials announced the death on Monday, and the Centers for Disease Control and Prevention confirmed it was the nation's first due to bird flu.

Health officials have said the person was older than 65, had underlying medical problems and had been in contact with sick and dead birds in a backyard flock. They also said a genetic analysis had suggested the bird flu virus had mutated inside the patient, which could have led to the more severe illness.

Few other details about the person have been disclosed.

https://apnews.com/article/bird-flu-death-louisiana-82e4d00876e62cb2b13bb621826c84f9

Have we been culling as part of the transformation of the food system to reduce meat and egg consumption?

Lack of trust

- Farmers refuse to test asymptomatic cows as there is no benefit and potential harms
- Farmers doubt biosecurity measures work
- Farmers distrust testing and secrecy regarding tests
- Farmworkers find PPE uncomfortable and do not sufficiently understand methods to prevent spread
- Federal authority to **impose** testing is limited, and has required the states to act, funded by USDA

PPE in Texas and Massachusetts dairies

The NEW ENGLAND JOURNAL of MEDICINE

NEJM Outbreaks Update — H5N1: A View from the States

Authors: Eric J. Rubin, M.D., Ph.D., Lindsey R. Baden, M.D., Robert Goldstein, M.D., Ph.D., Jennifer A. Shuford, M.D., M.P.H., and Stephen Morrissey, Ph.D. Author Info & Affiliations

Published March 12, 2025 | DOI: 10.1056/NEJMe2502863 | Copyright © 2025

"... working very closely with agriculture, we recognize that it's actually really hard to wear PPE when you are out on a dairy farm, and it is not routine practice to wear PPE on the dairy farm. And so rather than force the dairy farmers to do something that is going to be very hard to comply with, we've instead heavily leaned on our testing program. If we can test on a monthly basis, if we can make sure that there's no H5N1 present in the state, and even broader, across New England, we can then reassure ourselves that these folks are going out to the farms and keeping themselves protected.

There's always been some level of personal protection that exists on farms — changing clothes as you get to the farm and as you leave the farm. Those things remain in place. But we aren't instituting a new PPE program here in **Massachusetts** for dairy cattle." **Robbie Goldstein, MD, PhD**

"So we've worked with our Texas Division of Emergency Management and made sure that we have pushed PPE out across the state, and so that it's available for dairy farms that would like to have greater access to this PPE.

We, too, know that it's maybe an unrealistic expectation that these dairy farm workers are going to be using all of this PPE. We live in **Texas**, you know, during the summer months, it's routinely over a hundred degrees here, and to put on the amount of garb that's recommended is probably, like I said, unrealistic.

And so while we've made it widely available, we're not confident that it's being used widely". **Jennifer Shuford, MD, MPH**