IN-16 Zoonoses, food poisoning and the animals we live with

HEALING after the FALL, research library, IN-16

Researched 10 October 2026 by Claude Opus agent for THRIVING after the FALL, Book Four. Library document, unverified.

How to read this report

A village that keeps animals and preserves its own food meets infections the supermarket era forgot. Almost none is treated by a herb. Almost all are prevented by a temperature, a fence, a lid or a rule about what is never eaten. This report is weighted accordingly, and is honest about the two diseases where prevention failure is near a death sentence: botulism and systemic anthrax.

The library is not repeated. Boiling and chlorination are in HY-02, latrine siting and animal faeces in HY-04, rats as reservoir in HY-06, outbreak investigation in IN-13, antibiotic salvage and dosing in IN-05, honey under 12 months in IN-07, tapeworm treatment in IN-08 (THRIVING library, HY-02, HY-04, HY-06, IN-13, IN-05, IN-07, IN-08). Rabies is in IN-15 and excluded here, as the brief directs.

Two disagreements. IN-05 lists co-trimoxazole for brucellosis with a [VERIFY] on duration. The sources read here make doxycycline with rifampicin for six weeks the adult regimen, co-trimoxazole the fallback for children under eight and in pregnancy. IN-07 grades honey under 12 months X, which is right, but the share of infant botulism actually caused by honey is smaller and more disputed than a flat prohibition implies.

Findings by section

1. The one-page map: animal, food, infection

Source	Infection	Route	Prevention that works	Untreated outcome
Goat, sheep, cow milk	Brucellosis	Raw milk and cheese, kidding, abortions	Boil milk, gloves at kidding	Months of fever, 1 to 5% die, mostly endocarditis
Animal found dead	Anthrax	Skinning, butchering, eating it	Never open or eat it, burn or bury deep	Cutaneous 5 to 20%, gut 25 to 60%
Home-preserved low-acid food	Botulism	Toxin preformed in jar or pit	Pressure canning, acidify, boil before eating	About 70% died before ventilators
Sheep and goats at lambing	Q fever	Inhaled dust from birth products	Lamb away from the house, burn placentas	1 to 2% of hospitalised, 2% go chronic

Source	Infection	Route	Prevention that works	Untreated outcome
Rats, flood water, wet stores	Leptospirosis	Urine into cuts, eyes, mouth	Rodent-proof stores, boots, cover cuts	Weil's form 5 to 15%
Cat faeces, undercooked meat	Toxoplasmosis	Oocysts in soil, cysts in meat	Pregnant woman avoids litter and raw meat	Fetal infection 2% at 6 weeks, 56% at 30
Dog eating sheep offal	Hydatid disease	Dog faeces to human mouth	Never feed raw offal to dogs, worm the dog	Slow cysts, surgical disease
Pig plus human latrine	Taenia solium, cysticercosis	Pork cysts, then faeces to mouth	Pen pigs from latrines, cook pork	29% of epilepsy in endemic areas
Pig, bear, horse	Trichinellosis	Larvae in muscle	Cook to 71 to 74 degrees	Usually survived, heart and brain cases die
Rabbit, hare, muskrat	Tularaemia	Skinning, tick, inhalation	Gloves when skinning, cook through	Ulceroglandular 5 to 6%, typhoidal 35 to 50%
Rodent droppings in a shed	Hantavirus	Inhaled while sweeping	Air out, wet down, never dry-sweep	Pulmonary form 30 to 40%
Rat bite, fouled milk	Rat-bite fever	Bite, or milk	Rodent control, wash bites	7 to 10%
Parrots, poultry	Psittacosis	Inhaled dried droppings	Ventilate, wet-clean cages	15 to 30% in severe untreated cases
Chicken, egg, fouled food	Salmonella, Campylobacter	Food and hands	Cook, separate, wash	Self-limiting, kills the very young and old
Minced beef, raw milk	E. coli O157	Food	Cook mince through	HUS in children, antibiotics may worsen
Soft cheese, cold meat	Listeria	Food, in pregnancy	No soft cheese or raw milk in pregnancy	Fetal loss in about a quarter of cases
Damp maize, groundnut	Aflatoxin	Eating mouldy grain	Dry hard, sort, store cool and dry	Kenya 2004, 125 deaths in 317 cases
Ergot in rye and wild oats	Ergotism	Sclerotia milled into flour	Sort the black horns out	Gangrene, convulsions, death
Triatomines in walls, fruit juice	Chagas	Crushed bug in food	Plaster walls, heat the pulp	Fatal myocarditis in acute oral cases

2. Botulism: the one the home preserver makes

Tradition. Fermented fish, fish eggs, seal oil and whale skin are ancient and nutritionally serious. Home canning is the same instinct in glass.

Record. Alaska recorded 226 cases from 114 outbreaks between 1950 and 2000, every patient an Alaska Native, every known cause a fermented food (Alaska Division of Public Health, search summary). Case fatality ran near 50%

before 1961 by one source and 31% for 1950 to 1959 by another, fell to 9% from 1967 to 1974, and averaged 3% from 1990 to 2000, with no Alaskan death since 1994. Incidence rose while mortality fell, and the rise is attributed to method: fish were once aged in the ground in grass-lined holes, and since the 1970s in plastic or glass, above ground or indoors. Warmth and a sealed bucket are what type E wants.

Sobel and colleagues found 263 United States cases from 1990 to 2000, Alaska supplying 103 (39%) in 58 events, case fatality 3%. All 49 Alaskan events with an identified food were homemade, chiefly seal oil (14), fish foods (14), fermented aquatic mammal tissue (11) and fish eggs (7), and type E caused 84%. In the lower 49 states a non-commercial food was implicated in 70 of 77 events (91%), most often home-canned vegetables (44%) (Sobel et al. 2004).

Inference. The spores are everywhere: 5.7% of British soils, 16.5% of Japanese, 23.3% of Costa Rican, 23.5% of Argentine, 24.3% of United States (French soil review 2025, search summary). They survive hours of boiling at 100 degrees and are killed by moist heat at 120 degrees for 30 minutes (Iowa State CFSPH, search summary). The canning rule follows: a twelve-log reduction of proteolytic spores, which at a D value of about 0.21 minutes at 121.1 degrees gives about 2.5 minutes, rounded up (thermal-process references, search summary, my arithmetic [VERIFY]).

The USDA rules are three (NCHFP, read). The dividing line is pH 4.6. Foods above it, meaning all meat, fish, poultry, milk and most vegetables, need a pressure canner at 240 to 250 degrees Fahrenheit, 116 to 121 Celsius, at 10 to 15 pounds per square inch, for 20 to 100 minutes by food, pack and jar size. Acid foods at or below 4.6, meaning fruit, pickles, sauerkraut and jam, need 5 to 85 minutes in boiling water. Tomatoes and figs sit on the line and must be acidified. Toxin forms in moist low-acid food between 4 and 49 degrees Celsius with less than 2% oxygen.

The toxin, unlike the spore, is fragile. Two independent sources quote the CDC figure of 85 degrees internal for at least 5 minutes, and the NCHFP gives the household form, boil 10 minutes below 1,000 feet with 1 minute per further 1,000 feet. Both warn this is a backup, not a licence to eat under-processed food.

Treatment. Case fatality approached 70% in the first half of the twentieth century and fell below 5% with modern intensive care, particularly mechanical ventilation. The guideline's own sentence is the one to print: almost all patients with botulism can survive, even without antitoxin, if they receive supportive care (Rao et al. 2021). Of 402 adults, 184 (46%) needed intubation and ventilation, 87% of them within two hospital days. Of 360 children, 91 (25%) needed it. Of 17 pregnant patients, 11 (69%) had respiratory failure. Paralysis lasts weeks to months. Antitoxin within two days gave a mortality odds ratio of 0.22 across 1923 to 2016 data, and cut median hospital stay from 25 to 15 days.

The symptoms, in order of frequency: difficulty swallowing, blurred vision, slurred speech, gut symptoms, dry mouth, breathlessness and double vision, with descending paralysis, drooping lids and frozen eye movements as the signs. Pupils were unreactive in only 25% of a large confirmed series, so reacting pupils do not exclude it (Rao et al. 2021).

The hard truth. Antitoxin needs hyperimmunised animals, plasma fractionation and a cold chain. It will not be made at a district infirmary. What is available is what Copenhagen proved in 1952, when Henry Lassen's team at Blegdam Hospital, on Bjorn Ibsen's proposal, tracheostomised polio patients and ventilated them by hand with a rubber bag, staffed by medical and dental students in shifts, some trained in under ten minutes. Accounts differ, from 200 students to more than 1,500 logging over 165,000 hours, and on the mortality fall, given as 90% to 15% or 90% to 20% (secondary accounts, search summaries). Lassen's 1953 Lancet paper could not be obtained, so the percentages are [VERIFY], but the principle does not depend on them. A person squeezing a bag, relieved every few hours, keeps a paralysed patient alive for the weeks the nerve endings need. That is the most important transferable fact here.

Infant botulism is a different disease, spores colonising the gut rather than preformed toxin. The honey link is real but smaller than the prohibition implies: in California the share of cases with a honey history fell from about 40% in the 1970s to about 5% in the 2000s (search summary quoting a study, original not read, [VERIFY]). A 1978 CDC investigation found the organism in three opened honey jars from case homes and in none of over 100 other

samples. About 94% of cases occur at or before six months, and the signs are constipation, weak cry, poor feeding and floppiness. The rule stands because obeying it costs nothing.

3. Anthrax: the animal that died

Record. The best field evidence comes from northern Ghana, 2005 to 2016, with 38 human deaths recorded. Upper East had 83 cases and 30 deaths, 36.1%, with a median case-fatality rate of 35.0% (95% CI 21.1 to 66.7). Of 43 livestock outbreaks in the Northern region to 2012, humans fell ill in 6 (14.0%), producing 28 cutaneous cases of whom 6 (22.2%) died. Residents slaughtered, butchered and distributed meat from sick or dead livestock, and some believed cooking it with particular herbs made it safe. The authors attribute the fatality to unrecognised gastrointestinal anthrax, poor provider awareness, distance from treatment and untested herbal remedies (EID 2021, Ghana anthrax, read). It is not the anthrax that is unusual, it is the hunger that makes a family eat the cow that dropped dead.

Numbers. Untreated cutaneous anthrax kills about 20% and treated under 1% by CDC's MMWR material, with a review giving 10 to 40% untreated and a 2021 CDC paper 5 to 20% untreated cutaneous and 25 to 60% untreated gastrointestinal. A Turkish series of 39 adults, 92.3% given penicillin G, had 2.6% mortality. Inhalational and meningeal forms are the most lethal (search summaries).

Sverdlovsk. The Meselson team's 1994 Science paper is the standard reference for inhalational anthrax in a civilian population. Access was refused (HTTP 403) and what follows is from secondary accounts, marked [VERIFY]. The team concluded an aerosol escaped from a military microbiology facility in early April 1979, and not, as the Soviet authorities claimed, that the deaths came from tainted meat. Victims clustered along the wind axis from the facility to the southern city limit, with livestock dying further south on the same line. Deaths are given as 62, at least 64 or at least 68 in roughly 94 cases, the first after four days and the last six weeks later. The village lesson: a long tail of onsets from one exposure is characteristic, and the official explanation for an outbreak is sometimes the explanation that protects the official.

Treatment. Current CDC guidance for naturally acquired uncomplicated cutaneous anthrax in a non-pregnant adult gives doxycycline 100 mg every 12 hours or ciprofloxacin 500 mg every 12 hours, with amoxicillin 1 g every 8 hours where the isolate is penicillin-susceptible, for 7 to 10 days (Bower et al. 2023, search summary). The 2001 MMWR gave penicillin V 500 mg every 6 hours for 5 to 7 days for localised disease and intravenous penicillin G 4 to 6 million units every 6 hours for 7 to 10 days for severe disease, with systemic signs, extensive swelling or head and neck lesions the triggers for the intravenous route. The 60-day courses in the literature belong to aerosol exposure, not to a village case. Oral doxycycline converts a 20% death rate to near 1% in cutaneous disease and will not save gastrointestinal or inhalational anthrax.

Carcass rules. The WHO 2008 manual, reached only by secondary quotation after two failed fetches, holds that most countries forbid post-mortem examination when anthrax is suspected, because the organism needs oxygen and does not sporulate in a closed carcass. Incineration is preferred, deep burial acceptable, and body openings plugged before moving a carcass (Canadian Food Inspection Agency, search summary). On lime the sources conflict: an Arkansas rule calls for an inch of lime, while Canadian guidance says calcium products may shield spores. No source read supported a two-metre depth. Arkansas requires at least two feet of cover and a site 100 yards from a well.

4. Brucellosis: the price of raw milk

Tradition. Raw milk is credited across Europe, the Near East and Central Asia with virtues the boiled version loses. Themistocles Zammit identified unpasteurised goat milk as the cause of undulant fever on Malta in 1905.

Record. The best current estimate is 2.1 million human cases a year, Africa alone near 514,000 (Laine et al. 2023, search summary). The widely quoted 500,000 may be a regional figure. Untreated case fatality is about 2% by one

European source and 1 to 5% by another, and endocarditis causes up to 80% of deaths while occurring in 0.3 to 0.7% of cases. Incubation is usually 1 to 4 weeks, ranging from 5 days to 6 months (search summaries).

Treatment. The 1986 Joint FAO/WHO Expert Committee proposed rifampicin 600 to 900 mg daily with doxycycline 200 mg daily for six weeks. WHO's 2006 text, reached through BMJ Best Practice, recommends a tetracycline for six weeks plus either streptomycin for 2 to 3 weeks or rifampicin for six weeks, for adults and children of eight and over. The Ioannina consensus of 2006 agrees and adds gentamicin as an alternative to streptomycin. The Cochrane review of 25 studies found doxycycline plus rifampicin less effective than doxycycline plus streptomycin, relapse risk ratio 2.39 (95% CI 1.17 to 4.86), and six weeks better than under 30 days. Relapse runs 14 to 17% for the rifampicin combination and 30 to 40% for short courses. For children under eight and in pregnancy, tetracyclines and quinolones are avoided and co-trimoxazole with rifampicin for six weeks appears in paediatric formularies, with sources disagreeing [VERIFY].

Prevention. Boiling. Pasteurisation standards are 63 degrees for 30 minutes or 72 degrees for 15 seconds, benchmarked on *Coxiella burnetii*, the most heat-resistant non-sporing pathogen in milk. A Basrah review gives 62.7 degrees for 30 minutes as adequate for *Brucella*, and a veterinary summary gives boiling for 10 minutes as usually effective (search summaries). A village without a thermometer should boil: the margin is enormous and the fuel cost small.

Cheese is not a safe harbour. In Afyon tulum cheese, *B. melitensis* at 4 and 6 log cfu per gram fell below detection by day 30 of ripening, but *B. abortus* behaved differently and the result depended on strain and dose (Kara and Akkaya 2015, abstract). A Sicilian study of short-ripened raw sheep cheese reported survival and replication. Ripening is not a kill step. In 2026 Los Angeles County investigated a cluster in which every confirmed case had eaten unpasteurised cheese, and an Andalusian outbreak of early 2002 was traced to raw goat cheese from one farmhouse.

5. The ordinary diarrhoeas, and the rule about antibiotics

Antibiotics prolong Salmonella carriage. The Cochrane review by Onwuezobe, Oshun and Odigwe pooled twelve trials and 778 participants, at least 258 of them children. Antibiotics gave more negative cultures in the first week but more positive cultures after three weeks and more relapses, no significant difference in length of illness, diarrhoea or fever against placebo, and more adverse reactions (search summary of the 2012 abstract). In ordinary non-typhoidal Salmonella, in a patient who is not septic, not an infant and not immunocompromised, giving nothing is better and saves the tablet. Typhoid is in IN-11 (THRIVING library, IN-11).

Antibiotics may precipitate haemolytic uraemic syndrome in O157. The evidence is contested. Wong and colleagues in 2000 followed 71 children under ten and found antibiotics a risk factor, relative risk 17.3 (95% CI 2.2 to 137) on a small sample. Safdar and colleagues pooled nine studies in 2002 and found an odds ratio of 1.15 (95% CI 0.79 to 1.68), concluding no increased risk. Freedman and colleagues in 2016 found both protection and harm across 17 studies, and in the least-biased subset estimated 2.24-fold greater odds with antibiotics (all through search summaries). The village rule: bloody diarrhoea in a child after mince or raw milk means fluids, no antibiotics, and watching urine output.

Campylobacter is a very small dose. The infectious dose is 500 organisms or fewer by the Public Health Agency of Canada and Ireland's HPSC, an amount that fits in one drop of chicken juice. Retail chicken carriage has been measured at 54 to 73% in the United Kingdom, 61% in Thailand and 90% in Australia. Guillain-Barre syndrome follows about 49 infections per 100,000 by United States surveillance, while an outbreak study of about 8,000 cases found 0 (95% CI 0 to 3) (search summaries). The consequence is not that chicken is dangerous but that the board, knife and hands that touched it are.

Listeria and pregnancy. In the French MONALISA cohort, 107 of 818 patients had maternal-fetal infection and fetal loss occurred in 26 (24%), all before 26 weeks, with major adverse outcomes in 83%. Published perinatal case

fatality runs 22 to 45% and incubation can reach 70 days. In pregnancy: no soft cheese, no raw milk, no cold cooked meat unless reheated to steaming.

Cooking temperatures. The USDA FSIS chart, read through two reproductions: whole cuts of beef, pork, veal and lamb to 145 Fahrenheit, 63 Celsius, with a 3-minute rest, ground meat and sausage to 160 Fahrenheit, 71 Celsius, all poultry including ground to 165 Fahrenheit, 74 Celsius, leftovers to 165, eggs until yolk and white are firm. Colour is not reliable. WHO's Five Keys gives the village version: cook until soups boil and meat juices run clear, and note that 70 degrees helps make food safe.

6. The husbandry zoonoses: birth, flood, cat, rodent, bird, bug

Q fever. The Dutch epidemic of 2007 to 2009 notified 3,523 cases. Nine deaths occurred among 749 hospitalised patients, 1.2% in hospital and 0.26% of all notified cases by my arithmetic, while victim organisations later counted 74 including chronic cases. About 2% of those infected develop chronic Q fever months to years later, as endocarditis, vascular aneurysm or prosthesis infection, with existing valve disease the main risk (search summaries). The scale of shedding is what matters: one abortion can release up to a billion organisms per gram of placenta, ewes shed in faeces for up to 8 days after lambing and goats for up to 20, and airborne dust from birth products probably caused the epidemic.

Leptospirosis. Weil's disease kills 5 to 15% in most reports, with São Paulo death-notification data giving 15, 11 and 18% for 2004 to 2006. Weekly doxycycline 200 mg prophylaxis has a famous Panama trial in which attack rate fell from 4.2% to 0.2%, but the Cochrane review of three trials found no significant reduction and more vomiting (Brett-Major and Lipnick, search summary). Boots, covered cuts and rodent-proof stores are the intervention.

Toxoplasmosis. Transmission to the fetus rises through pregnancy while severity falls: 2.2%, 23.0% and 56.0% at 6, 18 and 30 weeks in a French study, and roughly 15, 25 and 65% by trimester in clinical summaries. First and second trimester infection causes the severe disease, with about 3% ending in miscarriage or stillbirth. The SYROCOT individual-patient meta-analysis of 550 live-born children found no evidence that prenatal treatment reduced clinical manifestations, adjusted OR 1.11 (95% CI 0.61 to 2.02). Since the village has neither spiramycin nor pyrimethamine, prevention is the whole of it.

Tularaemia. Merck gives case fatality as almost nil treated and about 6% untreated for ulceroglandular disease, up to 50% untreated for typhoidal, septicaemic and pneumonic forms, and an Iowa factsheet gives 5% and 35%. First line is streptomycin or gentamicin for 7 to 10 days, with doxycycline for 14 to 21 days in milder disease, tetracycline observational data showing 88% cure and 12% relapse (search summaries). Prevention is gloves when skinning rabbits, hares and rodents.

Hantavirus. The pulmonary syndrome killed 38% of 335 United States cases reported to March 2003, with later tallies of 36 to 37% and other sources quoting 30 to 50%. Haemorrhagic fever with renal syndrome is milder, 0.4% in a Swedish series of 5,282 Puumala patients and 5 to 15% for Hantaan and Dobrava. There is no treatment. The entire intervention is the cleaning rule: open the building for 30 minutes before entering, never sweep or vacuum dry, soak droppings with chlorine for at least 15 minutes and wipe up wet. Sources give one cup of bleach to a gallon, one and a half cups, or a 10% solution (THRIVING library, HY-02).

Rat-bite fever and psittacosis. CDC puts untreated rat-bite fever fatality at 7 to 10%, with intravenous penicillin the drug of choice and a Qatari case report giving 400,000 to 600,000 IU daily for one to two weeks. Haverhill fever is the same organism from milk or water fouled by rats. Psittacosis untreated is given at 15 to 20% by Arizona's health department and up to 30% in severe cases elsewhere, falling under 1% with oral tetracycline for at least 10 days.

Chagas. The vector route is in HY-06, the food route here. In Brazilian surveillance from 2014 to 2023, 3,408 acute cases were recorded, 2,869 (84.1%) presumed oral, with 45 deaths, about 1.3% by arithmetic. A Venezuelan outbreak of 119 cases hospitalised 20.3% and killed a five-year-old of acute myocarditis, against 95 to 99% of vector-

borne acute infections being asymptomatic. The reason is dose: one crushed bug in a drink may deliver an estimated 600,000 metacyclic trypomastigotes. Acai and bacaba juice are the documented vehicles, and a village pressing fruit in bug country should heat the pulp and keep the press covered and lit.

7. The worms of meat, dog and latrine

Trichinellosis. CDC's 2003 advice for wild game, especially bear, was 160 Fahrenheit, 71 Celsius, and its 2024 report on a 2022 outbreak raised this to at least 165 Fahrenheit, 74 Celsius. The two documents disagree by era and the later figure is safer. Freezing works for pork at defined combinations, 5 Fahrenheit for 20 days, minus 9.4 for 10 days, minus 22 for 6 days by Merck's table, and cannot be relied on for other meats. *Trichinella nativa* is freeze-resistant: in the 2022 outbreak motile larvae were recovered from bear meat frozen more than 15 weeks, and the family had frozen it 45 days before serving. Two of the six cases had eaten only the vegetables cooked with the meat, and all six recovered. A 2000 Saskatchewan outbreak involved bear meat eaten by 78 people, with 87% of those followed up fully recovered. A black bear series reported myocardial infarction and venous sinus thrombosis among the complications (search summaries).

Taenia solium. The Ndimubanzi systematic review pooled the proportion of people with epilepsy who have neurocysticercosis at 29.0% (95% CI 22.9 to 35.5), robust to exclusion of any single study. That one number justifies the rule. The cycle needs pigs with access to human faeces. Break it with a pen and a latrine the pig cannot reach, and cook the pork. Treatment of the intestinal carrier is in IN-08 (THRIVING library, IN-08).

Hydatid disease. The control record is the most encouraging and the most demanding here. Iceland began in 1863. By 2002 Iceland, New Zealand and Tasmania had declared elimination, and a CDC report notes eradication in insular settings came only after more than 40 years. The method was dog treatment, first with arecoline hydrobromide and later with praziquantel, fully effective against all forms of *Echinococcus granulosus* in the dog but a tenicide and not an ovicide. The obstacle elsewhere has been dosing rural dogs eight times a year for decades. Tasmania still has cases, the Falklands after 50 years still find low prevalence, and no South American endemic area has achieved eradication after 30 years of praziquantel (search summaries). Without the drug a village cannot run this programme. It can do the free half: never feed raw sheep offal to a dog, burn or bury offal at slaughter, wash hands after handling dogs.

8. The moulds of the store

Aflatoxin. The Kenya outbreak of April 2004 is the best-documented acute aflatoxicosis on record: 317 cases and 125 deaths by 20 July 2004, about 39% by arithmetic, with a later analysis giving 477 poisonings at 40% case fatality since 2004. Lewis and colleagues surveyed 65 markets and 243 vendors, collecting 350 maize products. Fifty-five per cent exceeded the Kenyan limit of 20 parts per billion, 35% exceeded 100 ppb and 7% exceeded 1,000 ppb. Makueni, the worst district, had a geometric mean of 52.91 ppb against Thika's 7.52. Maize from local farms in the affected area was likelier to exceed 20 ppb, odds ratio 2.71 (95% CI 1.12 to 6.59). The companion case-control study found aflatoxin B1 up to 4,400 ppb, and a CDC preliminary report household samples from 20 to 8,000 ppb (search summaries).

Prevention is post-harvest and within a village's reach: dry thoroughly, ventilate and cool the store, and sort out mouldy and damaged grains and nuts throughout drying and storage. A West African trial usually cited as Turner and colleagues 2005 reportedly cut exposure by about 60% over five months with hand sorting, drying on mats and better storage. I could not read it, the country is given variously as Gambia and Guinea, and the figure is [VERIFY].

Ergot. The Codex maximum for sclerotia is 0.05%, in the European Union 0.5 grams per kilogram of unprocessed cereal, tightened to 0.2 g/kg for cereals other than rye in 2022. Binding flour limits are now set on alkaloids, 500 micrograms per kilogram for rye milling products, falling to 250 from 2028. EFSA's 2012 opinion set a group acute reference dose of 1 microgram per kilogram body weight and a tolerable daily intake of 0.6 (search summaries). The tolerable quantity is very small, and a sorting standard near one part in two thousand by weight is the village target.

Pont-Saint-Esprit in August 1951 affected about 250 to 300 people with five to seven deaths, with nausea, cold sweats, weak pulse and prolonged hallucinations, attributed at the time to ergot in bread from one bakery, with mercury-treated seed and nitrogen trichloride as rivals and the CIA-LSD theory disputed by every scientific source read. Ethiopia in 1977 to 1978 had the last epidemic-size outbreak with nearly 50 deaths, and a 2001 outbreak of gangrene in Arsi Zone was traced to barley containing ergotised wild oats. Milled ergot becomes a red powder, obvious in light flour and easy to miss in dark rye, and alkaloids can be present with no visible sclerotia. Hand-sorting the black horns out before milling is the only control, and it worked for centuries.

9. The husbandry rules themselves

Animals out of the house. The evidence is mixed but points one way. In Uganda, children in households with more than five poultry had 83% higher diarrhoea prevalence. A 1988 Lima case-control study found household exposure to live chickens a risk factor, adjusted odds ratio 11. In urban Kenya, poultry ownership raised *E. coli* in household soil but not in stored water. Headey and colleagues, in Ethiopia, Bangladesh and Vietnam, found poultry ownership beneficial but keeping poultry indoors overnight detrimental, with visible animal faeces negatively associated with height-for-age in Bangladesh and Ethiopia but not Vietnam. A Malawi analysis found no association with enteric dysfunction biomarkers at 18 months (search summaries, originals not read, effect sizes [VERIFY]). The supported rule is modest: keep animals and their faeces out of the sleeping and food space, especially overnight, and do not treat the dog or goat as the enemy.

The slaughter rule. This is the second commandment after milk boiling. An animal found dead, or dead of an illness nobody understands, is not food and not hide. Cooking does not make it safe, and the belief that particular herbs do cost lives in Ghana.

The store. Rodent-proofing removes leptospirosis, hantavirus and rat-bite fever at once, with the losses that drive people to eat mouldy grain.

Evidence grades

Practice or remedy	What it does	Grade
Boiling milk	Brucellosis, bovine TB, milk-borne Q fever	B
Pressure canning at 116 to 121 degrees	Botulism	B
Boiling a jar's contents 10 minutes	Destroys preformed toxin	B
85 degrees for 5 minutes	Destroys botulinum toxin	B
Pork and bear to 71 to 74 degrees	Trichinellosis	B
Poultry to 74 degrees	Campylobacter, Salmonella	B
Never eating or skinning an animal found dead	Anthrax	B
Burning or deep burial, carcass unopened	Stops sporulation	B
Lime on an anthrax carcass	Contested, may shield spores	D
Hand ventilation by relay	Keeps the paralysed alive	B
Botulinum antitoxin within 2 days	Mortality OR 0.22	B
Doxycycline plus rifampicin 6 weeks	Cures brucellosis, 14 to 17% relapse	A
Doxycycline plus streptomycin	Fewer relapses, RR 2.39 against rifampicin arm	A

Practice or remedy	What it does	Grade
Doxycycline or ciprofloxacin, cutaneous anthrax	20% to about 1% fatality	B
Withholding antibiotics in Salmonella	Avoids prolonged carriage and relapse	A
Withholding antibiotics in suspected O157	Contested, possible 2.24-fold HUS odds	C
Weekly doxycycline for leptospirosis	No significant benefit, more vomiting	X
Praziquantel to dogs 8 times a year	Eliminated hydatid on three islands	B
Penning pigs from human faeces	Breaks the cysticercosis cycle	B
No raw offal to dogs	Breaks the hydatid cycle	B
Drying, sorting, cool dry storage	Reduces aflatoxin	B
Hand-sorting ergot from rye	Ergotism	C
Wet chlorine cleaning of droppings	Hantavirus	C
Pregnancy: no cat litter, no raw meat	Congenital toxoplasmosis	C
Pregnancy: no soft cheese or raw milk	Listeriosis	B
Prenatal spiramycin for toxoplasmosis	No significant reduction, OR 1.11	C
Poultry out of the house overnight	Less child diarrhoea	C
Cooking the dead animal with herbs	Believed protective, is not	X
Fermenting fish in sealed plastic	Raised Alaskan botulism	X

Means ledger

Intervention	Hands and knowledge	Hearth	Garden and still	Village dispensary	District infirmary	Hospital before the Fall
Milk safety	Know the rule	Boil every drop	Thermometer, timed hold	Record which herds abort	Herd serology, cull	Pasteurisation plant
Low-acid preserving	Avoid it	Acidify, dry, salt, ferment	Pressure canner with gauge	Two gauges, written process times	Batch records, pH paper	Validated 12D retort
Botulism care	Recognise, clear airway	Boil suspect food, discard jar	Nothing added	Bag and tube, relay of four	Tracheostomy, suction, rota	Ventilator, antitoxin, under 5% death
Anthrax	Never open the dead animal	Burn the carcass	Deep pit, fuel, gloves	Doxycycline, eschar left alone	Intravenous penicillin, fluids	Multidrug IV, antitoxin
Brucellosis	Recognise undulant fever	Boil milk	Separate kidding pen	6 weeks of two drugs	Same plus murmur follow-up	Serology, valve surgery

Intervention	Hands and knowledge	Hearth	Garden and still	Village dispensary	District infirmary	Hospital before the Fall
Meat cooking	Juices clear, no pink mince	Cook through, separate boards	Thermometer	Teach and check	Same	Thermometers, inspection
Grain storage	Sort by eye and nose	Dry hard, raise off ground	Rat-proof bins and collars	Condemn lots communally	Microscope, lot records	Laboratory assay
Hydatid	No raw offal to dogs	Burn or bury offal	Same	Praziquantel if salvaged	Ultrasound, surgery	Imaging, albendazole, drainage
Cysticercosis	Pen the pig, cook pork	Latrine the pig cannot reach	Same	Treat tapeworm carriers	Plus anticonvulsants	Imaging, albendazole with steroids
Rodent control	Remove food and harbourage	Lidded stores	Traps, cats, hard floors	Village-wide campaign	Same	Professional control

What each rung changes. Hands and knowledge prevent anthrax, hydatid and most trichinellosis. The hearth, with fire and a pot, prevents brucellosis, bovine TB, milk-borne Q fever, most Salmonella and Campylobacter, trichinellosis and any toxin already in the jar: most of the burden here. The garden and still rung adds the pressure vessel, the only thing that makes low-acid preserving safe, and the rodent-proof bin. The dispensary adds the antibiotic courses that convert cutaneous anthrax, brucellosis, tularaemia and rat-bite fever from disabling to curable. The infirmary adds relay ventilation, the only treatment for botulism, and the intravenous route for systemic anthrax. The pre-Fall hospital adds antitoxins, laboratory confirmation and dialysis, none of which will return.

Harm test

Boiled milk. No harm beyond scalds. Turn pot handles inward.

Pressure canning. The vessel scalds or bursts if the vent blocks or the lid is opened under pressure. A gauge reading low means under-processing and botulism. A village needs two gauges checked against each other and a written process time for every food, because canning by memory is the commonest route to a fatal jar.

Boiling a suspect jar. Safe, but it tempts people to eat what they should destroy. A bulging lid, broken seal, spurting liquid or off smell means destruction, not boiling. Never taste.

Honey. Never under 12 months. After that it is safe.

Doxycycline. Never in pregnancy, never under eight outside life-threatening need, because of tooth staining and bone effects. Causes photosensitivity and oesophageal ulceration if swallowed dry or lying down. Take upright with water and food.

Rifampicin. Turns urine, tears and sweat orange, which frightens the unwarned. Interacts widely and causes hepatitis. A six-week course given badly breeds resistance in coexisting tuberculosis (THRIVING library, IN-10).

Penicillin. Anaphylaxis kills in minutes. Never give it to anyone who has had a rash, swelling or wheeze after it.

Praziquantel in dogs. Overdose in a heavily infected dog causes vomiting and ataxia. Dose by weight and treat its faeces as infectious for days after.

Chlorine for droppings. Damages eyes and lungs. Ventilate, never mix with ammonia or acid, use the weakest effective strength (HY-02).

Antibiotics for ordinary diarrhoea. Prolongs Salmonella carriage, raises relapse, may raise HUS risk in O157, and spends stock needed for pneumonia.

Who must never receive what. Pregnant women: no doxycycline, no ciprofloxacin, no raw milk, no soft cheese, no cat litter, no lambing pen, no handling of aborted material. Infants under 12 months: no honey. Children under eight: no tetracyclines. The dehydrated and the old: fluids before any antibiotic (THRIVING library, HY-03).

Misidentification. Botulism is mistaken for myasthenia gravis, Guillain-Barre syndrome and stroke. Guillain-Barre ascends, botulism descends. Cutaneous anthrax is mistaken for a spider bite or a boil, and is distinguished by being painless with massive swelling. Brucellosis is mistaken for typhoid, malaria and tuberculosis.

Signs it is going wrong. In botulism, falling breath-holding time, a weakening cough and a rising respiratory rate come before collapse. Act when the patient cannot count to ten in one breath, not when they turn blue. In anthrax, swelling past the elbow or into the neck means systemic disease oral drugs will not hold. In brucellosis, a new murmur means endocarditis, which is what kills.

Red flags

1. **Descending paralysis with dry mouth, drooping lids and double vision after a home-preserved or fermented food.** Botulism. Without relay hand ventilation the patient dies when the diaphragm goes. Organise four people per patient in six-hour shifts from the first breathlessness and expect weeks. Nothing by mouth once swallowing fails. Destroy the food and warn everyone who shared it.
2. **A painless black ulcer with blistered rim and gross swelling after butchering.** Cutaneous anthrax. Under 1% die treated, about one in five untreated, more if the neck swells and closes the airway. Do not cut or drain the eschar.
3. **Fever, vomiting and bloody diarrhoea with abdominal swelling after eating meat off an animal that died.** Gastrointestinal anthrax, 25 to 60% fatal untreated. Start oral antibiotics knowing they will often not be enough, and destroy the meat.
4. **Falling urine output and pallor in a child with bloody diarrhoea.** Haemolytic uraemic syndrome. No dialysis exists. Fluids carefully, no antibiotics, and honesty with the family.
5. **Fever in a pregnant woman with no other explanation.** Listeria, brucellosis and Q fever all take the fetus. Say so early.
6. **Breathlessness and shock four to ten days after cleaning a rodent-infested shed.** Hantavirus pulmonary syndrome. Nothing touches it. Thirty to forty per cent die within days. Sit with them.
7. **A new murmur with months of undulant fever.** Brucella endocarditis, the cause of most brucellosis deaths. Six weeks of two antibiotics is the only chance.
8. **Seizures in an adult in a pig-keeping district.** Neurocysticercosis. Anticonvulsants, if any exist, are worth a great deal.

Honest comfort in every case: warmth, position, mouth care, pain relief if any exists, truth given plainly and early, and company (THRIVING library, FO-08, FO-10).

The case against

The fear of animals is itself a harm. The dog and the goat are food security, draught, manure and company, and the pig turns waste into protein. Headey and colleagues found poultry ownership beneficial even where indoor

overnight keeping was not. A document listing twenty zoonoses can frighten a household out of the animal economy that keeps it alive. The animals stay, the rules change.

Raw milk has defenders. The case is enzymes, flora and flavour, and the observation that most raw milk is drunk without incident. The reply is that brucellosis incubates over weeks and is rarely connected to the glass by the drinker, that the modelled burden is 2.1 million cases a year, and that the Los Angeles cluster of 2026 and the Andalusian outbreak of 2002 both traced cleanly to raw cheese. Nobody argues that boiling fails.

The evidence here is weaker than it looks. Several central numbers come from single studies or sources I could reach only in summary. The 2.24 odds ratio for antibiotics and HUS sits beside a pooled 1.15 that found nothing. The Cochrane leptospirosis review found no benefit where a famous Panama trial found 95% efficacy. SYROCOT found no benefit from a prenatal treatment textbooks still recommend. Hantavirus case fatality fell from 38% to about 30% as milder cases were counted. Assume the untreated case-fatality rates quoted across this literature are biased upwards, because the mild and unrecognised cases are missing from the denominator.

Named critics. Thomas McKeown's argument, taken up in SY-03, is that the mortality decline came from food and sanitation rather than clinical medicine (THRIVING library, SY-03). It supports the primacy of milk boiling and carcass rules over drugs, and warns against believing any particular rule did the work. The critique of lay medicine in SY-01 applies directly: a reader following a canning table from memory, or judging a gauge by feel, is more dangerous than one who decides not to can low-acid food at all (THRIVING library, SY-01). A village should prefer drying, salting, acid fermentation and root-cellaring, and treat a verified pressure canner as a privilege rather than a norm.

10-line summary

1. Boiling milk, cooking meat through and never eating an animal found dead prevent most of the disease in this report, at almost no cost.
2. Botulism killed about 70% before mechanical ventilation and under 5% with it, and relay hand ventilation, proved in Copenhagen in 1952, is the treatment a district can give.
3. Foods above pH 4.6 are safe only when processed at 116 to 121 degrees under pressure, and boiling the contents 10 minutes before eating destroys toxin but not spores.
4. Alaskan botulism rose when fermentation moved into sealed plastic above ground, and fatality fell from 31 to 50% down to 3% through recognition and evacuation, not better food.
5. Untreated cutaneous anthrax kills 5 to 20% and treated about 1%, and northern Ghana recorded a median 35% field fatality from eating meat off animals that died.
6. Brucellosis needs six weeks of two drugs, relapses in 14 to 17% even then, and is prevented by a boiling pot.
7. Antibiotics prolong Salmonella carriage and may raise the odds of haemolytic uraemic syndrome in O157, so the default in ordinary diarrhoea is fluids and nothing else.
8. About 29% of epilepsy in endemic areas is neurocysticercosis, and the pig pen and the latrine break that cycle.
9. Aflatoxin killed 125 of 317 in Kenya in 2004, and drying hard, sorting and cool dry storage is the control.
10. Hydatid disease was eliminated on three islands by worming dogs for over forty years, and the free half is never feeding raw offal to a dog.

Open questions

- Whether untreated case-fatality rates for cutaneous anthrax, tularaemia and rat-bite fever, drawn from pre-antibiotic or passive surveillance, overstate risk because mild cases went uncounted.
- Whether antibiotics truly cause haemolytic uraemic syndrome in O157 or merely mark sicker patients. The pooled estimates disagree and no randomised trial exists.
- What ripening time, if any, reliably kills *Brucella melitensis* in a farmhouse cheese. The Turkish data suggest 30 days for one cheese, a Sicilian abstract suggests survival, and no general rule is supported.

- Whether the 60% reduction in aflatoxin exposure attributed to a West African post-harvest package is real, and in which country the trial was done.
- Whether keeping animals out of the house measurably reduces child diarrhoea, since Uganda and Peru point one way and the Malawi biomarker study finds nothing.
- Whether a village can make a serviceable pressure gauge, and verify one without a reference instrument. This is the largest gap between the canning rule and the village's means.

Sources to read in full

1. Rao AK, Sobel J, Chatham-Stephens K, Luquez C. 2021. Clinical Guidelines for Diagnosis and Treatment of Botulism. The only modern clinical guideline, and the source of the statement that almost all patients survive on supportive care alone.
2. Sobel J and colleagues. 2004. Foodborne Botulism in the United States, 1990-2000. The Alaska data and the home-canned share.
3. USDA, Complete Guide to Home Canning, with the National Center for Home Food Preservation pages. The pH 4.6 rule, the pressure tables, the altitude corrections.
4. WHO 2008, Anthrax in Humans and Animals, 4th edition. The carcass rules and the clinical forms. I could not open it and the book should.
5. The Emerging Infectious Diseases 2021 report on human anthrax in northern Ghana. The field fatality rate and the behaviour that produces it.
6. WHO and FAO 2006, Brucellosis in Humans and Animals, with the 2006 Ioannina consensus beside it.
7. Lewis L and colleagues. 2005, Environmental Health Perspectives, on aflatoxin in Kenyan market maize, with the companion case-control study.
8. Heymann DL (ed), Control of Communicable Diseases Manual, 21st edition. The reference behind half the summaries used here. Not read.
9. Ndimubanzi PC and colleagues. 2010, PLoS Neglected Tropical Diseases, on neurocysticercosis in people with epilepsy.
10. Lassen HCA 1953 in the Lancet, on Copenhagen and manual ventilation. Not obtained, and the largest single gap here.

At the bedside after the Fall

A household. Four habits and one refusal. Boil all milk. Cook all meat through, no pink in mince, clear juices in poultry. Keep a separate board and knife for raw meat, or scald the board. Wash hands after the animals and before the food. The refusal: an animal found dead is never eaten, never skinned and never fed to the dog. It needs a lidded pot, fire, soap, a second board, and someone who will not be argued out of the rules. The first failure to expect is the hungry winter in which someone butchers a sheep that died in the night.

A village of 300. Add a written preserving standard with process times, kept on the wall and not in a head. A slaughter place away from houses and well, with a pit for offal and a fire. A rule that the dog is never fed raw offal and pigs are penned away from latrines. A healer who can recognise descending paralysis and a painless black ulcer, and who holds the doxycycline. It needs a working pressure vessel and two gauges, carcass pits, rodent-proof bins, gloves for kidding and skinning, and a book of the rules. The first failure to expect is the preserving standard being abandoned the first season a new food is tried.

A district of 3,000. Add what numbers buy. A relay that can hand-ventilate one patient for six weeks, about twenty-four people trained and willing, with the tracheostomy and suction skill to match. A herd register of which animals aborted and where, which is how brucellosis and Q fever are found. A microscope, and a healer who can see mould on grain and cysts in meat. An antibiotic reserve held for anthrax, brucellosis and tularaemia and not spent on diarrhoea. The first failure to expect is the ventilation rota collapsing in week two, when the novelty goes and the harvest calls.

Protocols

Protocol 1. Milk. 1. Strain through clean cloth. 2. Heat covered, stirring, to a rolling boil. 3. Hold it 5 minutes by a counted clock. Where fuel is short, 30 minutes at about 63 degrees is the equivalent, but needs a thermometer. 4. Cool covered. 5. Discard milk from any animal that has just aborted, for 20 days in goats and 8 in sheep. 6. Tolerance: boiling is forgiving, undershooting is not.

Protocol 2. Preserving low-acid food. 1. Decide first whether the food is above pH 4.6. All meat, fish, poultry and most vegetables are. 2. Without a working pressure canner and a verified gauge, do not can it. Dry it, salt it, ferment it with enough acid, or keep it cold. 3. With one, process at 10 to 15 pounds per square inch, 240 to 250 Fahrenheit or 116 to 121 Celsius, for the written time for that food, pack and jar size, between 20 and 100 minutes. 4. Add time or pressure above 1,000 feet by the written table. 5. Label every jar with food and date. 6. Store below 35 degrees Celsius, ideally 10 to 21. 7. Before eating any home-canned low-acid food, boil the contents 10 minutes, adding 1 minute per 1,000 feet above 1,000 feet. 8. Destroy without tasting any jar with a bulging lid, broken seal, spurting liquid or off smell, by burning or burial beyond animal reach.

Protocol 3. Fermenting fish or meat, if it must be done. 1. Ferment the traditional way, in the ground in a grass-lined hole, cool and shaded. 2. Never in sealed plastic or glass, never indoors or in the sun. These changes raised Alaskan botulism after 1970. 3. Boil before eating, which destroys toxin at 85 degrees in 5 minutes. 4. Accept that this reduces but does not remove the risk, and that children and pregnant women should not eat it.

Protocol 4. Slaughter and carcass. 1. Never slaughter or open an animal found dead or dead of an unknown illness. 2. If anthrax is suspected, do not open the carcass. Plug the natural openings with absorbent cloth before moving it. 3. Burn it where it lies if fuel allows. 4. If burying, dig at least two feet of cover, 100 yards from any well or stream, and fence the site against digging animals. 5. Do not apply lime. The guidance conflicts and calcium may protect the spores. 6. Burn the clothes and wash tools in strong chlorine. 7. For healthy animals, slaughter away from house and well, and burn or deep-bury the offal beyond any dog's reach.

Protocol 5. Suspected botulism. 1. Ask what was eaten in the last 6 hours to 10 days and who else ate it. 2. Look for drooping lids, double vision, slurred speech, dry mouth and difficult swallowing, then weakness descending from face to shoulders, arms and chest. 3. Measure the breath: count aloud to 30 in one breath, and record the number reached every 2 hours. 4. Stop all food and fluid by mouth once swallowing is unsafe. 5. When the count falls below 10, or the cough weakens, prepare to ventilate. 6. Ventilate by bag through mask or tube at about 12 breaths a minute, with just enough volume to lift the chest. Relay in shifts no longer than 2 hours at the bag and 6 hours per team. 7. Turn two-hourly, keep eyes moist and closed, keep the mouth clean, empty the bladder. 8. Expect weeks. Recovery is the rule if breathing is maintained. 9. Find, destroy and record the food, and warn every household that shared it.

Protocol 6. Suspected cutaneous anthrax. 1. Recognise it: an itchy bump becoming a blister, then a painless black-centred ulcer with swelling out of proportion to the sore, 1 to 7 days after handling an animal or hide. 2. Do not cut, squeeze or drain it. 3. Start doxycycline 100 mg twice daily or ciprofloxacin 500 mg twice daily for 7 to 10 days in a non-pregnant adult. Where only penicillin exists, penicillin V 500 mg every 6 hours for 5 to 7 days was the older regimen. 4. Cover with a dry dressing and burn the dressings. 5. Swelling past the elbow or into the neck, fever or breathlessness mean systemic disease needing the intravenous route. 6. Apply Protocol 4 to the animal and to everyone who touched it.

Protocol 7. Cleaning a rodent-infested store. 1. Open all doors and windows and leave 30 minutes before entering. 2. Do not sweep or beat dust. 3. Wet all droppings, nests and dead rodents with chlorine solution and leave 15 minutes. 4. Wipe up with cloth, not a brush, and burn the cloth. 5. Wash hands and face, launder the clothes. 6. Rodent-proof before restocking: hard floor, raised bins with metal collars, lidded containers, no spillage.

Protocol 8. Grain and groundnut store. 1. Dry until a grain shatters rather than dents under a thumbnail, within days of harvest, on mats and not bare earth. 2. Sort by hand, discarding every discoloured, shrivelled, mouldy or insect-

damaged grain or nut, and every black horn of ergot in rye. 3. Store closed, dry, rodent-proof and cool, raised off the ground and away from walls. 4. Inspect monthly. Caking, warmth, musty smell or visible mould condemns the lot. 5. Never feed condemned grain to animals that will be eaten, and never grind it to hide the mould. 6. Tolerance: the regulatory target of 10 to 20 parts per billion cannot be measured in a village, so sorting and dryness are the only controls.

Protocol 9. The dog and the pig. 1. Never feed raw offal, especially sheep liver and lungs, to any dog. 2. Burn or deep-bury offal at every slaughter. 3. Worm the dog with praziquantel where any exists, and treat its faeces as infectious for several days after. 4. Pen pigs so they cannot reach human faeces, and site latrines accordingly. 5. Wash hands after handling any dog, and keep dogs out of the kitchen and off the bed. 6. Cook all pork through, 71 degrees minimum and 74 for safety, including sausage and incompletely cured products.

Numbers to carry

1. **pH 4.6.** Above it, pressure-process at 116 to 121 degrees. Below it, boiling water is enough.
2. **85 degrees for 5 minutes, or 10 minutes at a rolling boil.** Destroys botulinum toxin. Does not destroy spores.
3. **71 degrees for mince and pork, 74 for poultry and bear, 63 with a 3-minute rest for whole cuts.** The cooking temperatures.
4. **70 per cent to under 5 per cent.** Botulism case fatality before and after mechanical ventilation. Hands on a bag bridge it.
5. **20 per cent to 1 per cent.** Cutaneous anthrax untreated and treated. Ghana's field figure, where meat from dead animals was eaten, was 35.
6. **Six weeks, two drugs, 14 to 17 per cent relapse.** Brucellosis, and the reason to boil the milk.
7. **29 per cent.** The share of epilepsy in endemic areas that is neurocysticercosis.
8. **125 deaths in 317 cases, 39 per cent.** Kenya, 2004, aflatoxin in maize.
9. **500 organisms.** The infectious dose of Campylobacter, about one drop of raw chicken fluid.
10. **12 months.** No honey before it. **40 years.** How long three islands took to eliminate hydatid disease by worming dogs.

References

1. Rao AK, Sobel J, Chatham-Stephens K, Luquez C. 2021. Clinical Guidelines for Diagnosis and Treatment of Botulism, 2021. MMWR Recommendations and Reports 70(2):1-30. https://www.cdc.gov/mmwr/volumes/70/rr/rr7002a1.htm (full text read to approximately the first 100,000 characters).
2. Sobel J, Tucker N, Sulka A, McLaughlin J, Maslanka S. 2004. Foodborne Botulism in the United States, 1990-2000. Emerging Infectious Diseases 10(9):1606-1611. https://wwwnc.cdc.gov/eid/article/10/9/03-0745 (full text read).
3. National Center for Home Food Preservation, University of Georgia, for the USDA. Ensuring Safe Canned Foods. https://nchfp.uga.edu/how/general/ensuring-safe-canned-foods/ (read).
4. National Center for Home Food Preservation. Guidance on boiling home-canned low-acid foods 10 minutes below 1,000 feet, adding 1 minute per additional 1,000 feet (read in search summary, original page not opened).
5. United States Centers for Disease Control and Prevention. Guidance that heating food to an internal 85 degrees Celsius for at least 5 minutes decontaminates affected food or drink (read in two independent search summaries, original CDC page not opened).
6. Center for Food Security and Public Health, Iowa State University. Botulism technical factsheet. https://www.cfsph.iastate.edu/DiseaseInfo/notes/Botulism.pdf (read in search summary).
7. Alaska Division of Public Health and CDC material on foodborne botulism in Alaska 1950-2000, 226 cases from 114 outbreaks, fatality by decade (read in search summary, primary report not located).

8. Meselson M, Guillemin J, Hugh-Jones M, Langmuir A, Popova I, Shelokov A, Yampolskaya O. 1994. The Sverdlovsk anthrax outbreak of 1979. Science 266:1202-1208. https://meselsonarchive.hsites.harvard.edu/sverdlovsk (access refused, HTTP 403. Reported only from secondary accounts, marked [VERIFY]).
9. High Case-Fatality Rate for Human Anthrax, Northern Ghana, 2005-2016. 2021. Emerging Infectious Diseases 27(4). https://pmc.ncbi.nlm.nih.gov/articles/PMC8007318/ (full text read. The author list was not captured in the text read [VERIFY]).
10. Bower WA and colleagues. 2023. CDC Guidelines for the Prevention and Treatment of Anthrax, 2023. MMWR Recommendations and Reports 72(RR-6). https://pmc.ncbi.nlm.nih.gov/articles/PMC10651316/ (read in search summary and through its treatment table).
11. Bower WA and colleagues. 2015. Clinical Framework and Medical Countermeasure Use During an Anthrax Mass-Casualty Incident. MMWR Recommendations and Reports 64(RR-4). https://www.cdc.gov/mmwr/preview/mmwrhtml/rr6404a1.htm (read in search summary).
12. United States Centers for Disease Control and Prevention. 2001. Update: Investigation of Bioterrorism-Related Anthrax and Interim Guidelines for Exposure Management and Antimicrobial Therapy. MMWR 50(45). https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5045a5.htm (read in search summary).
13. World Health Organization. 2008. Anthrax in Humans and Animals, 4th edition. Geneva. (Two fetch attempts failed, HTTP 502 and a reCAPTCHA page. Reported only from secondary quotation.)
14. Canadian Food Inspection Agency. Disposal of Anthrax Carcasses and Contaminated Materials. https://inspection.canada.ca/en/animal-health/terrestrial-animals/diseases/reportable/anthrax/disposal (read in search summary).
15. Laine CG and colleagues. 2023. Global Estimate of Human Brucellosis Incidence. Emerging Infectious Diseases 29(9). https://wwwnc.cdc.gov/eid/article/29/9/23-0052 (read in search summary).
16. Yousefi-Nooraie R and colleagues. Antibiotics for treating human brucellosis. Cochrane Database of Systematic Reviews, CD007179. https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD007179 (access refused, HTTP 403. Abstract read in search summary).
17. Ariza J and colleagues. 2007. Perspectives for the treatment of brucellosis in the 21st century: the Ioannina recommendations. PLoS Medicine 4(12):e317. https://journals.plos.org/plosmedicine/article/info:doi/10.1371/journal.pmed.0040317 (read in search summary).
18. GPnotebook. Brucellosis treatment, including the caution against tetracyclines and quinolones in children under eight and in pregnancy. https://gpnotebook.com/pages/infectious-disease/brucellosis/treatment (read in search summary).
19. Kara R, Akkaya L. 2015. Behaviour of Brucella abortus and Brucella melitensis in Afyon tulum cheese. https://acikerisim.balikesir.edu.tr/items/57b0c20b-b11c-400d-b39c-b2ca3e1059d2 (abstract read in search summary).
20. Codex Alimentarius standards and a 2022 Frontiers in Microbiology study of Coxiella burnetii heat inactivation in milk. https://www.frontiersin.org/journals/microbiology/articles/10.3389/fmicb.2021.753871/epub (read in search summary).
21. Onwuezobe IA, Oshun PO, Odigwe CC. 2012. Antimicrobials for treating symptomatic non-typhoidal Salmonella infection. Cochrane Database of Systematic Reviews CD001167.pub2. https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD001167.pub2/information (abstract read in search summary).
22. Wong CS and colleagues. 2000. The risk of the hemolytic-uremic syndrome after antibiotic treatment of Escherichia coli O157:H7 infections. New England Journal of Medicine 342:1930-1936. https://pubmed.ncbi.nlm.nih.gov/10874060/ (abstract read in search summary).
23. Safdar N and colleagues. 2002. Risk of hemolytic uremic syndrome after antibiotic treatment of Escherichia

coli O157:H7 enteritis: a meta-analysis. JAMA 288:996-1001. https://pubmed.ncbi.nlm.nih.gov/12190370/ (abstract read in search summary).

24. Freedman SB and colleagues. 2016. Shiga toxin-producing Escherichia coli infection, antibiotics, and risk of developing hemolytic uremic syndrome: a meta-analysis. https://pmc.ncbi.nlm.nih.gov/articles/PMC6287940 (reported from a secondary review quoting the 2.24 odds ratio. Original not read).
25. Public Health Agency of Canada, Campylobacter jejuni pathogen safety data sheet, and Ireland's Health Protection Surveillance Centre guidance, for the infectious dose of 500 organisms or fewer (read in search summaries), with United Kingdom Food Standards Agency retail surveys.
26. Charlier C and colleagues, the MONALISA study, and related reviews of listeriosis in pregnancy, for the 24 per cent fetal loss figure and the 22 to 45 per cent perinatal case fatality range (read in search summaries, originals not read).
27. United States Department of Agriculture Food Safety and Inspection Service. Safe Minimum Internal Temperature Chart. https://www.fsis.usda.gov/food-safety/safe-food-handling-and-preparation/food-safety-basics/safe-temperature-chart (read through two state extension reproductions).
28. World Health Organization. Five Keys to Safer Food, poster and manual. https://who.int/publications/i/item/9789241594639 (read in search summary).
29. van der Hoek W and colleagues and related reviews of the Dutch Q fever epidemic 2007-2010. Epidemiology and Infection 2011. https://resolve.cambridge.org/core/services/aop-cambridge-core/content/view/9B3BAC610F8EE1F8B080E2B7DB959F86/S0950268810002268a.pdf (read in search summary).
30. Brett-Major DM, Lipnick RJ. Antibiotic prophylaxis for leptospirosis. Cochrane Database of Systematic Reviews CD007342.pub2. https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD007342.pub2 (abstract and plain-language summary read in search summary).
31. Takafuji ET and colleagues. 1984. An efficacy trial of doxycycline chemoprophylaxis against leptospirosis, Panama. New England Journal of Medicine (reported through secondary summaries giving 4.2 per cent to 0.2 per cent).
32. Dunn D and colleagues, French cohort data on mother-to-child transmission of Toxoplasma by gestational age, read in search summary of review articles.
33. SYROCOT Study Group. 2007. Effectiveness of prenatal treatment for congenital toxoplasmosis: a meta-analysis of individual patients' data. Lancet (read in search summary).
34. Ndimubanzi PC and colleagues. 2010. A Systematic Review of the Frequency of Neurocysticercosis with a Focus on People with Epilepsy. PLoS Neglected Tropical Diseases 4(11):e870. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2970544/ (read in search summary).
35. United States Centers for Disease Control and Prevention. 2024. Outbreak of Human Trichinellosis, Arizona, Minnesota and South Dakota, 2022. MMWR 73(20). https://www.cdc.gov/mmwr/volumes/73/wr/mm7320a2.htm (read in search summary).
36. United States Centers for Disease Control and Prevention. 2004. Trichinellosis associated with bear meat. MMWR 53(27). https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5327a2.htm (read in search summary).
37. Merck Veterinary Manual. Preventing Trichinellosis table. https://www.merckvetmanual.com/multimedia/table/preventing-trichinellosis-trichinosis (read in search summary).
38. Craig PS and colleagues. Control of cystic echinococcosis and hydatidosis, 1863-2002. https://publikationen.ub.uni-frankfurt.de/opus4/frontdoor/index/index/year/2010/docId/14163 (read in search summary), with a Falkland Islands status paper in Parasitology 2023 and a 2025 Emerging Infectious Diseases report.
39. Merck Manual Professional Version. Tularemia. https://www.msdmanuals.com/professional/infectious-diseases/gram-negative-bacilli/tularemia (read in search summary), with an Iowa Department of Public

Health factsheet and a New Mexico Department of Health manual.
40. United States Centers for Disease Control and Prevention. 2005. Fatal rat-bite fever, Florida and Washington, 2003. MMWR 53(51). https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5351a2.htm (read in search summary).
41. Arizona Department of Health Services, Zoonotic Disease Manual, psittacosis chapter. https://www.azdhs.gov/documents/preparedness/emergency-preparedness/zebra-manual/zm-s5-psittacosis.pdf (read in search summary).
42. Hantavirus pulmonary syndrome case fatality and rodent-droppings cleaning guidance, from Park County Colorado, Durham Region and World Health Organization materials (read in search summaries).
43. Brazilian surveillance of acute Chagas disease 2014-2023 and the Venezuelan oral outbreak of 119 cases, reported through a clinical news summary and an abstract (read in search summaries, originals not read).
44. Lewis L and colleagues. 2005. Aflatoxin Contamination of Commercial Maize Products during an Outbreak of Acute Aflatoxicosis in Eastern and Central Kenya. Environmental Health Perspectives 113(12). https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1314917/ (read in search summary).
45. Azziz-Baumgartner E and colleagues. 2005. Case-Control Study of an Acute Aflatoxicosis Outbreak, Kenya, 2004. Environmental Health Perspectives. https://stacks.cdc.gov/view/cdc/3870 (read in search summary).
46. Global Alliance for Improved Nutrition. 2016. Technological and Market Interventions for Aflatoxin Control in Ghana. https://www.gainhealth.org/sites/default/files/publications/documents/technological-and-market-interventions-for-aflatoxin-control-in-ghana-2016.pdf (read in search summary).
47. Agriculture and Horticulture Development Board. Limits for ergot sclerotia and alkaloids in traded grain and certified cereal seed. https://ahdb.org.uk/knowledge-library/limits-for-ergot-sclerotia-and-alkaloids-in-traded-grain-and-certified-cereal-seed (read in search summary), with Commission Regulation (EU) 2021/1399 and the German Federal Institute for Risk Assessment questions and answers on ergot alkaloids.
48. Secondary accounts of the Pont-Saint-Esprit outbreak of August 1951 and of the Ethiopian ergotism epidemics of 1977-1978 and 2001 (read in search summaries, no primary source located).
49. Secondary accounts of the Copenhagen poliomyelitis epidemic of 1952 and the manual ventilation programme of Lassen and Ibsen, including a New Statesman long read and several medical-history reviews. Lassen's 1953 Lancet paper was not obtained and the mortality percentages are marked [VERIFY].
50. Headey D, Hirvonen K and colleagues on livestock, animal faeces and child growth in Ethiopia, Bangladesh and Vietnam, through an ENN Field Exchange summary and a University of Florida presentation. https://ennonline.net/fex/55/animalfaecesnutrition (read in search summary, originals not read).
51. Poultry Ownership Associated with Increased Risk of Child Diarrhea: Cross-Sectional Evidence from Uganda. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7056431/ (read in search summary).
52. Meta-analysis of D-values of proteolytic Clostridium botulinum and its surrogate Clostridium sporogenes PA 3679. https://hal.inrae.fr/hal-02638031 (read in search summary), with a 2025 review of botulinum-producing clostridia in soils. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC12323636/ (read in search summary).
53. THRIVING library documents HY-02, HY-03, HY-04, HY-06, FO-08, FO-10, IN-05, IN-07, IN-08, IN-10, IN-11, IN-13, IN-15, SY-01 and SY-03, in the same folder as this report.