



CAPITOL BUILDING, PHOENIX, ARIZONA.

BIENNIAL REPORT

OF THE

Live Stock Sanitary Board

To June 30, 1900.

PRESS OF
THE ARIZONA REPUBLICAN
PHOENIX

REPORT
OF THE
Live Stock Sanitary Board
FOR THE
FISCAL YEARS 1899-1900.

THE LIVE STOCK LAW.

The Live Stock law enacted in 1897, under which the live stock industry is regulated and governed as to sanitary and other conditions, is in the main an excellent one, and has been largely instrumental in upbuilding the industry involved since its passage.

Recent developments have, however, materialized which make some additional legislation necessary and important, and such suggestion will be offered in the course of my review of the past two years' work, as will in the opinion of the Board remedy such defects as now exist.

The brand book, which under the provisions of the Act referred to, was required to be printed and placed in the hands of the various County Recorders, was officially accepted by the board on December 14th, 1898, 4,000 copies being contracted for by the Board.

The value of this work cannot be over-estimated, and although the number of copies disposed of has been far less than was expected, the book is one that will be a valuable source of information and utility to the stockmen of the Territory for many years to come.

The last two years have witnessed an era of prosperity for the cattlemen unprecedented in the history of Arizona. High prices and a brisk demand have perpetually obtained, and the losses consequent on drouth have been comparatively insignificant, although the period mentioned has been an exceptionally dry one.

The sanitary conditions existing are good, and such trace contagious disease as existed two years ago, have been all eliminated through the efforts of the Territorial Veterinar whose services have been efficient in a marked degree.

A detailed report by Dr. Norton on the general health conditions, etc., is hereto attached.

The volume of work passing through the office of the Board is large as shown by the Secretary's report, and the books and records are complete and highly creditable, and in this connection it is suggested that the meagre salary at present allowed the Secretary, only \$50 per month, is entirely inadequate and out of proportion to the responsibility and importance of the office.

THE INSPECTION SERVICE.

The inspection service has been and is reasonably efficient and of great value, but owing to strong opposition by certain butchers in the Territory, to the provisions of the law as applied to the inspection of animals and hides of animals slaughtered, the usefulness and protection offered by the law has been somewhat curtailed. It is very essential that the law be strengthened in this respect, and the most feasible plan to accomplish this end will be considered and submitted to the Legislature.

The Board has made every effort to enforce the law and has been extended every aid by the Attorney General, but owing to the long protracted litigation entered into by those violating the law a case of much importance is now awaiting a session of the Supreme Court for decision.

NUMBER OF LIVE STOCK IN THE TERRITORY.

The following table compiled from the records of the Board of Equalization gives the number of and value of live stock assessed in the Territory:

Apache County.

Horses, 2,914—\$47,425. Mules, 56—\$1,485. Asses, 148—\$858. Swine, 138—\$424.50. Cattle, 9,405—\$142,964. Sheep 111,426—\$222,852. Goats, 715—\$1,422.

Cochise County.

Horses, 3,831—\$66,077. Mules, 154—\$3,850. Asses, 118—\$593. Swine, 99—\$297. Cattle, 70,157—\$707,840. Sheep, 7,000—\$14,000. Goats, 3,183—\$6,348.

Coconino County.

Horses, 4,199—\$103,630. Mules, 12—\$480. Asses, 95—\$475. Swine, 268—\$804. Cattle, 12,137—\$128,645.60. Sheep, 125,155—\$250,310. Goats, 803—\$1,606.

Gila County.

Horses, 3,003—\$50,795. Mules, 121—\$3,025. Asses, 239—\$1,314. Swine, 428—\$1,474. Cattle, 33,823—\$339,120. Sheep, 7,040—\$14,140. Goats, 5,754—\$11,355.

Graham County.

Horses, 3,436—\$94,586.25. Mules, 161—\$4,623.98. Asses, 119—\$1,112. Swine, 636—\$1,908. Cattle, 36,392—\$371,310. Sheep, 8,562—\$17,124. Goats, 3,635—\$7,270.

Maricopa County.

Horses, 4,896—\$102,119. Mules, 175—\$4,875. Asses, 5—\$250. Swine, 2,049—\$5,122.50. Cattle, 22,188—\$288,551. Sheep, 13,344—\$26,688. Goats, 700—\$1,400.

Mohave County.

Horses, 2,207—\$67,855. Mules, 22—\$770. Asses, 50—\$250. Swine, 63—\$189. Cattle, 19,551—\$196,925. Sheep, 725—\$1,450. Goats, 1,900—\$3,800.

Navajo County.

Horses, 2,615—\$45,280. Mules, 30—\$900. Asses, 73—\$365. Swine, 216—\$1,080. Cattle, 4,451—\$56,780. Sheep, 73,691—\$147,382. Goats, 74—\$148.

Pima County.

Horses, 2,051—\$13,760. Mules, 161—\$4,045. Asses, 28—\$140. Swine, 233—\$703. Cattle, 34,681—\$351,675. Sheep, 3,590—\$7,180. Goats, 210—\$420.

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Pinal County.

Horses, 2,283—\$31,712. Mules, 135—\$3,375. Asses, 10—\$185. Swine, 138—\$414. Cattle, 21,961—\$259,109. Sheep, 1,000—\$2,000.

Santa Cruz County.

Horses, 1,929—\$31,035. Mules, 120—\$3,000. Asses, 44—\$185. Swine, 50—\$150.50. Cattle, 16,312—\$167,612. Sheep, 1—\$18. Goats, 25—\$50.

Yavapai County.

Horses, 6,589—\$117,337. Mules, 80—\$2,350. Asses, 166—\$1,414. Swine, 362—\$1,086. Cattle, 43,662—\$441,925. Sheep, 64,422—\$128,844. Goats, 3,296—\$6,592.

Yuma County.

Horses, 971—\$24,114.40. Mules, 95—\$2,375. Asses, 13—\$56. Swine, 516—\$1,548. Cattle, 1,538—\$24,150. Goats, 1—\$34.

Thus, while the number of cattle in 1900 is not quite so great as it was two years ago, the assessment rolls still show that we have on our ranges 326,258 head of cattle valued at \$3,476,606.60 and of sheep and goats 436,276 head, valued at \$872,433. These estimates are conservative goes without saying, and it is probable that if actual statistics were obtainable the number would be nearly double that shown.

 PERSONNEL OF THE BOARD.

The Live Stock Sanitary Board as at present constituted as follows:

Burt Dunlap, Chairman; Tucson.
 W. F. Nichols, Member; Willecox.
 Wm. H. Kay, Member; Glendale.
 H. Harrison, Secretary; Phoenix.
 J. C. Norton, D. V. M., Veterinarian; Phoenix.

 NEW LEGISLATION.

The following changes and additions to the present law (Act of the 19th Legislature) are in our opinion necessary and important

and are suggested by experience and observation of the operation of the law.

1. Slaughter house inspectors should be vested with authority to seize any meat, entrails, carcasses or parts of carcasses of animals slaughtered, in the possession of butchers or others that in their opinion is unfit for human food by reason of disease or other cause, and provision for the examination of such suspected meat by a competent physician or veterinarian, and a penalty imposed on those having such diseased meat in their possession, or exposing same for sale.

2. It is recommended that provision be made for the inspection of "herds driven" at any point in transit in the Territory upon the petition of at least five owners or breeders of live stock, conditioned that if upon inspection by a duly authorized inspector of the Board, the herd so inspected is found clean (free from cattle other than those that the parties in charge of the herd are lawfully authorized to move), the fees allowed by law for making such inspection shall be paid equally by the persons petitioning for the said inspection, and if strays or cattle be found that are not the property of the persons in charge, or that they have not lawful authority to move, then the said inspection fees for inspecting the whole herd shall be paid by the person in charge of said herd; together with the cost of returning such animal or animals to their proper range. This change should not be construed as conflicting with Section 25 of the present law, but supplementary thereto.

3. It is recommended that the word "age" be stricken from Section 39, in connection with the record required to be kept by butchers, owing to the impossibility of determining the exact age of an animal in many cases, and also the words "ages and weight" in Section 42 of the same act.

It is further recommended that a territorial butchers' license be provided for to be issued by the Board, and that all persons before engaging in the business of butchering be required to procure said license from the Live Stock Sanitary Board, and also to file a bond in the sum of one thousand dollars as at present provided by law, but on a form to be furnished by the Board; the conditions of such bond embracing the compliance of such sections of the law as is deemed necessary by the Board for maintenance of the law and the protection of the public health. That the Board have the

power at any time to cancel a license of any butcher for failure to comply with the requirements of the law, and that it be made a felony for any person to engage in the business of butchering and vending meat in the Territory of Arizona without first procuring such license and filing said bond.

5. It is further recommended that it be made a misdemeanor for any trader, hide dealer or other person to purchase any hide or horned or neat cattle until the same shall have been duly inspected and tagged as required by law, and the possession of such untagged hide shall be prima facie evidence of the commission of a misdemeanor unless the person in possession can show that the hide was taken from an animal slaughtered by him or was owned by him at the time of slaughter, or was taken from an animal that died while in his possession. This would in our opinion remedy a serious defect in the present law which has caused much litigation, and greatly curtailed the usefulness of the law.

6. It is further recommended that the words "or other common carrier" be inserted after "railroad company" in section 43.

7. We most urgently recommend that the salary of the Secretary of the Board be made \$100 a month in view of the great volume of work passing through the office and the responsibility attaching thereto, and we believe that an inspection of the books and records will demonstrate the wisdom and justice of such change.

Respectfully Submitted,

BURT DUNLAP,

Chairman Live Stock Sanitary Board.

REPORT OF SECRETARY OF BOARD.

Phoenix, Arizona, December 1st, 1900.

To the Live Stock Sanitary Board:

Gentlemen: I have the honor to submit the following report of work accomplished in this office for the two last fiscal years ending June 30th, 1900.

During that period there have been 1169 brands recorded, original applications and a corresponding number of certificates issued. The correspondence of the office for the same period was

as follows: 6300 regular letters, of which copies were taken, and a large number of circular letters, advices to inspectors and other miscellaneous mail matter pertaining to the brand recording and inspection service of which no copies were necessary, owing to their uniform character.

A complete book record has been kept of all the records and reports of the various inspectors by district, requiring the exclusive services of a competent clerk; this record consists of over 1400 pages of matter, two columns to the page, or over 112,000 lines of closely written matter covering the brands and marks of all cattle shipped from and slaughtered in the Territory of Arizona, together with the data as to shippers' and consignees' names and addresses and butchers' names and places of business.

This clerical work has been paid for out of the fees derived from the recording of brands and marks, as also have many other minor items of expense incurred by the office.

Pursuant to your instructions, a book was procured in which is kept a complete abstract of title of all brands that have changed hands since the original record was effected in this office; and also a book in which all bills of sale are recorded, prior to transferring a brand from the person in whose name it was originally recorded to that of a person acquiring the same by purchase or other lawful means.

The system of the office has been simplified as much as possible, but is necessarily an elaborate one, and entails an amount of labor far in excess of what was anticipated by the framers of the law. The correspondence is heavy, and, with the brand recording and work incident thereto, involves an amount of labor sufficient to consume the time of the Secretary, without considering the vast volume of work connected with the inspection service.

Then, too, a great deal of time is unavoidably consumed in attending to the wants of cattlemen visiting the office in quest of information and advice.

It is imperative that some legislation be recommended by you, governing the inspection of cattle and the hides of cattle slaughtered, and payment of inspectors' fees therefore, as the resistance by many butchers in the Territory to the present law has caused the resignation of many efficient inspectors, and as the matter now

stands a large number of your inspectors have given their services for several months without compensation, trusting to the courts ultimately adjust the matter.

During the period from July 1st, 1898, to June 30th, 1900, there were sold at the various inspection points 198 strays, which the sum of \$3,003.24 was received, and during the same period there was paid out to the claimants of 174 strays the sum \$3,506.64, and into the general fund of the Territory \$4,500.00.

The following statement shows the condition of the stray fund to July 1st, 1900:

July 1st, 1898. Cash on hand.....	\$5,414.
July 1, '98, to June 30, '99. Cash received for 114 strays.	1,690.
July 1, '99, to June 30, '00. Cash received for 84 strays..	1,312.
	\$8,417.9

July 1, '98, to June 30, '99. Cash paid out for 128 strays..	\$2,220.6
July, 1898. Cash paid into general fund.....	3,500.0
July 1, '99, to June 30, '00. Cash paid out for 46 strays..	785.9
December, 1899. Cash paid into general fund.....	1,000.0
Balance on hand July 1, 1900.....	911.2
	\$8,417.9

I attach hereto a list of the inspection points from which reports have been received during the period covered in my report together with the numbers of cattle shipped and slaughtered, as reported by your duly authorized inspectors.

These figures do not, however, adequately express the actual volume of business, as, owing to the resistance of the law already referred to, it has been impossible to get inspectors at all points to devote the time necessary to keeping a complete surveillance of the butchers within their respective districts, for the reason that they have been unable in many cases to collect the fees prescribed by law.

Very respectfully,

H. HARRISON, Secretary.

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REPORT OF CATTLE SLAUGHTERED AND SHIPPED FOR
THE FISCAL YEAR ENDING JUNE 30, 1899.

Town.	Slaughtered.	Shipped	
		Out.	Inside Shipments.
Ash Fork	101	7,053	649
Arizola		1,081	369
Aravaipa	111		
Apache	451		
Aravaca	92		
Bisbee	1,776	586	
Benson	232	5,326	285
Buenos Aires	25		
Clifton	1,471	2,924	
Congress	570	475	842
Calabasas		3,265	517
Casa Grande	152		
Crittenden	203		
Chloride	375		
Don Luis		9,275	203
Flagstaff	185		
Fort Grant	433		
Florence	458		
Glendale	196	2,432	859
Globe	1,641	3,334	
Gila Bend		28	116
Greaterville	17		
Geronimo	13	8,320	82
Holbrook	321	12,947	812
Huachuca	168	482	364
Hackberry	145	4,111	84
Jerome	1,371		
Kirkland	235	5,228	628
Kingman	972	74	
Mayer	458		2,031
Morenci	960		
Mammoth	287		
Mesa	468		
Navajo	127	885	
Nogales	238		37
Oro Blanco	12		

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Town.	Slaughtered.	Shipped Out.	Inside Shipments
Prescott	2,239	26	
Payson	6		
Phoenix	3,940	6,127	3,
Peach Springs	8	643	
Palomas	57		
Pearce	205		
Pantano	66	5,154	
Redington	142		
San Simon		5,665	
Springerville	6	1,878	
San Carlos	1,265		
Safford		365	
Seligman	43	5,429	2
Steam Pump	169		
Solomonville		3,024	
Fort Thomas	100		
Tucson	5,467	17,552	1,1
Tombstone	254		
Tempe	515	8,032	1,3
Walnut Grove	46		
Willcox	399	34,755	
Wickenburg	7	382	1,6
Winslow	745	6,805	
Williams	1,535	499	
Yuma	1,885		
Total	33,362	164,423	15,90

REPORT OF CATTLE SLAUGHTERED AND SHIPPED FOR
THE FISCAL YEAR ENDING JUNE 30, 1900.

Town.	Slaughtered.	Shipped Out.	Inside Shipments
Agua Caliente	58		
Ash Fork	57	1,183	28
Arizola		1,205	10
Aravaipa	36		
Apache	273		

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Town.	Slaughtered.	Shipped. Out.	Inside Shipments.
Aravaca	212		
Bisbee	2,358	3,793	434
Benson	90	18,066	51
Bowie		373	
Buenos Ayres	29		
Clifton	2,213	176	
Congress	449		1,522
Calabasas		2,644	287
Casa Grande	71		
Crittenden	280		
Chloride	375		
Don Luis		4,496	
Flagstaff	106		
Fort Grant	509		
Florence	536		
Glendale	123	2,553	1,479
Globe	1,589	6,886	524
Gila Bend	60	97	33
Greaterville	15		
Geronimo		4,979	218
Holbrook	299	10,663	582
Huachuca	51	1,424	
Hackberry		5,383	93
Jerome	1,396		
Kirkland	103	4,595	1,425
Kingman	781	88	187
Mayer	310	573	3,971
Morenci	600		
Mammoth	501		
Mesa	463		
Nogales	246		
Prescott	951		64
Navajo	217	999	
Payson	6		
Phoenix	3,032	7,950	4,638
Peach Springs		255	
Palomas	60	68	
Pearce	355		
Pantano	261	7,169	

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Town.	Slaughtered.	Shipped Out.	Inside Shipment
Russelville	120		
Redington	56		
San Simon	6	5,672	
San Carlos	1,037		
Safford		2,419	
Seligman	59	2,362	3
Steam Pump	91		
Solomonville		2,187	
Thomas	59	148	
Tucson	6,124	15,723	21
Tombstone	387		
Tempe	590	11,484	1,69
Walnut Grove	16		
Willcox	481	27,887	26
Wickenburg	30	922	
Winslow	488	3,055	
Williams	929	776	
Yuma	1,726		
Totals	<u>31,300</u>	<u>158,253</u>	<u>18,092</u>

REPORT
OF
Territorial Veterinarian.

LETTER OF SUBMITTAL.

Office of the Territorial Veterinarian,
Phoenix, Arizona, Dec. 31, 1900.

To the Live Stock Sanitary Board of Arizona:

I have the honor to submit the following report of my work as Territorial Veterinary Surgeon, under your direction for the two years ending December 31, 1900, together with brief statements of the causes, symptoms and treatment of the principal contagious diseases affecting live stock in Arizona for the assistance of the stockmen of the Territory.

Very respectfully,

J. C. NORTON,
Territorial Veterinary Surgeon.

REPORT OF TERRITORIAL VETERINARIAN.

The live stock of the Territory are now more nearly free from contagious diseases than at any time in the last ten years. Glanders, which has at times caused the quarantine of large numbers of horses is almost unknown in the Territory. Less tuberculous cattle are found here than in any other state or territory in the Union. Scabies still exists among some of our sheep, but it is on the decrease.

There has been a great deal of sanitary work, however, during the past two years, due mainly to the large number of people that have immigrated to our Territory from other States bringing in all classes of live stock. The rules requiring that all shipments of

live stock before entering the Territory be reported to the Territorial Veterinarian, who admits them either on the presentation of the proper health certificates or inspects them, have reduced the introduction of diseases to a minimum. In many instances diseases have been brought into the Territory by overland immigrant outfits which of course enter without the knowledge of the sanitary authorities. As our irrigated valleys become more thickly settled the greater the opportunity for the spread of contagious diseases.

In the following report I have not only given a brief statement of the work accomplished in guarding against the admission of disease and the attention given to the control and stamping out of contagious diseases, but have included a concise statement of the causes, symptoms and treatment of the principal contagious diseases affecting the domestic animals in the Territory trusting that those breeding live stock within our bounds will thereby be better prepared to detect disease among their stock early in its appearance and avoid great losses for themselves and neighbors.

These explanations in regard to diseases are not intended to be complete for the enlightenment of the veterinary profession but are expressed as far as possible in such language as will be plain and of assistance to the laymen of the Territory. Many of the questions answered in this report are those most frequently asked of the veterinarian in letters from remote parts of the Territory. Any stockman desiring more light in regard to any special diseases affecting the live stock of the Territory will cheerfully be assisted by the Territorial Veterinarian.

The sanitary work is intended mainly to combat contagious diseases which are due to some specific contagium or germ which must be present to produce the disease. Long before the microscope and advanced bacteriology were studied it was detected by closely observing people that certain diseases were not spontaneous but only appeared in animals or men that were placed in contact with animals or men similarly affected. Water is conducive to the production of alfalfa, yet the farmer knows that an entire reservoir turned onto the desert land will not produce a pound of alfalfa unless the alfalfa seed is present. He knows that if some alfalfa does appear that the seed has been carried to the desert by some camper or was dropped by passing animals. The same is true

of contagious diseases; though cold weather, lack of feed, inbreeding, etc., are favorable to the production of diseases, yet contagious diseases cannot develop unless the specific germ is present.

BLACKLEG.

Blackleg or symptomatic anthrax is an infectious disease caused by a specific germ, the blackleg bacillus, which each year causes the death of more cattle in Arizona than all other diseases combined.

During the past year I have received letters from stockmen in nearly every county in the Territory describing the symptoms of a disease that was causing the death of many of their cattle and the symptoms given were those of blackleg. It is one of the most fatal diseases affecting the bovine family causing death in from six to forty-eight hours from the time the first symptoms appear. The principal losses are in calves between the ages of six months and two years, but occasionally calves four or five months old and grown cattle are affected.

The germ gains entrance to the system with the food through some abrasion in the mucous membranes or through a scratch in the skin of the animal. The blackleg bacilli will not multiply in the presence of oxygen and this explains why they have no effect on the exposed parts of the body, but when the germs find entrance through a small wound in the skin or mucous membrane to the connective tissue under the skin away from the air they multiply rapidly. Only fat animals or those that are in a very thrifty condition are affected by the blackleg germ.

Symptoms. The first symptom usually noticed is stiffness in one quarter. Soon a soft swelling will appear, which will gradually spread. It will crackle when rubbed with the hand, due to the gases which form under the skin. As this swelling increases the temperature of the animal will gradually rise to from 105 to 107 degrees Fahrenheit, and respirations will increase to upward of one hundred per minute. The animal will finally lie down and be unable to rise, though it may not die for several hours.

Because the germs of blackleg live in the soil for years the carcasses and litter of all animals dying from this disease should not be left to decompose or be carried about by animals, or even buried,

but should be thoroughly burned. If buried, in a short time the germs will come to the surface to be taken up by other susceptible animals. Irrigation water frequently assists in carrying germs from one ranch to another.

TREATMENT.

The blackleg germ multiplies so rapidly and destroys its victim so quickly that treatment is of little use. No medicine has been discovered that is of much use in treating blackleg. A free incision into the tumor and washing the wound with a five per cent solution of carbolic acid is recommended, but we have never had good results from the treatment. If the animal is noticed just as it commences to stiffen up with blackleg it can often be saved by forcing it to take brisk exercise three or four times a day. Calves that are regularly exercised are much less likely to contract blackleg. A half-pound dose of epsom salts early in the attack is often of assistance.

VACCINATION.

Vaccine is now made which, if properly administered, will reduce the loss from blackleg to the minimum. Hundreds of thousands of calves are now vaccinated each year in this and other countries. The United States Bureau of Animal Industry has furnished the Territorial Veterinarian free of cost several thousand doses of blackleg vaccine during the past two years, most of which has been distributed among the cattle breeders of the Territory. I have vaccinated several hundred calves in the Salt River Valley each year, principally on ranches where it was positively known that blackleg germs existed, and the loss among these calves has been about one per cent.

The vaccine used is prepared by drying and heating some of the affected muscle of an animal that died from blackleg. The high temperature weakens the strength of the virus so that only a light attack of the disease is produced. This vaccine comes as a dry, brownish powder, which must be mixed in a mortar with a small amount of distilled or boiled water, and, after filtering, is injected under the skin of the animal with a hypodermic syringe.

As some calves are more readily affected than others even by the vaccine, it is well to see that vaccinated calves are regularly exercised each day for at least a week after vaccination. I will

gladly secure the vaccine for any stockmen who desire it, or application can be made direct to Dr. D. E. Salmon, Chief of the Bureau of Animal Industry, Washington, D. C.

ANTHRAX.

Because stockmen have often confounded blackleg with anthrax and have had needless anxiety as to the danger of the disease affecting not only calves but other live stock, a few points of difference in symptoms of the two diseases will be mentioned.

Anthrax, which is due to the bacillus anthracis, is the most infectious disease of animals known, as the germs are often carried long distances by flies, in the clothing of man or even on utensils used about the infected premises. The germs will live and multiply in the soil for years, so that a ranch once infected by anthrax will be dangerous to animals placed on it for all time to come.

Both germs gain entrance to the body in the same ways and both cause death in from six to forty-eight hours, with symptoms of fever and usually depression with loss of appetite. In anthrax the victim will occasionally become excited. The tumor which frequently appears on some part of the body in anthrax is hard to the touch, instead of soft as in blackleg.

Another radical difference between the effects of the germ of blackleg and anthrax is, that while the first usually affects young cattle only, the later attacks not only cattle of all ages, but all other domestic animals, and even man.

Recovery from blackleg seldom occurs and is still less frequent from anthrax.

We are glad to report that there has never been a single case of anthrax reported in Arizona, and this happy condition will continue if all assist in taking every precaution against the introduction of the germs. Reports show that there are tracts of land in Louisiana, California and other states where no stock can be safely raised unless protected by vaccination.

TUBERCULOSIS.

For many centuries consumption has been one of the principal diseases affecting the human family, and during the last fifty years much attention has been given to a similar disease affecting principally the bovine species among animals. It was not, however, until Koch discovered in 1882 the micro-organism known as the tubercle bacillus, the true germ of this disease, that any positive and advanced conclusions were agreed upon in regard to tuberculosis among animals.

It has since been demonstrated by thousands of scientists that the tubercle bacillus as described by Koch is ever present in tubercular deposits wherever found, either in man or animals. It is found that the identical bacillus affects not only man, but many of the domestic animals, including cattle, swine, sheep, dogs and cats. Rats and mice occasionally contract the disease from feeding about tuberculous cattle or swine and in turn carry the disease from barn to barn. Other small animals are given the disease experimentally.

In civilized countries where data can be secured it has been proved that one death in seven in the human family is due to tuberculosis. Allowing fifteen deaths per thousand on the present population, 75,000,000, this would furnish over 160,000 deaths per annum in the United States from tuberculosis.

The mortality in the human family due to tuberculosis is no greater than that from the combined effects of famine, war, cholera, yellow fever and smallpox.

With these facts before us, surely no one will question but whether it is important for us to see what connection, if any, there is between tuberculosis of man and tuberculosis of animals, and if the former can contract the disease from the latter, either by association or by the use of their products as articles of food.

TUBERCULOSIS IN MAN AND ANIMALS CO-EXISTENT.

There are two principal reasons why tuberculosis among animals should be eradicated as far as possible: first, because tuberculous meat and the dairy products from tuberculous animals are a menace to public health, and, second, the financial loss to the breeders of stock due to the ravages of tuberculosis. In this particular disease laws should not only tend to prevent its spread among animals, but should guard against its communication to man by using the infected milk and meat of tuberculous animals.

The following observations may change the opinions of any that may feel that there is no danger along this line. Investigation shows that wherever man is found not depending upon the products of cattle for food he is practically free from tuberculosis. The natives of the Pacific Islands, where there are no cattle, are not tuberculous. The inhabitants of our new possessions, the Hawaiian Islands, were comparatively free from consumption until European cattle were introduced. It is claimed that the North American Indian was free from tuberculosis until furnished beef by the government. This beef is furnished by contract and often inferior and diseased cattle are furnished. The Indian custom of eating large portions of the meat raw, especially of the internal organs, which are most frequently tuberculous, increases the danger. Many Indians no doubt contract tuberculosis from the white man.

Pigs may be affected by tuberculosis. The owner of a herd of tuberculous cattle in an eastern state withdrew his milk from the market and fed it to fatten pigs, which almost without exception became tuberculous.

Because tuberculosis usually assumes a chronic form, often requiring months for its development, it is hard to prove positively how much of the suffering in the human family from this disease is due to infection by the use of milk from tuberculous cows. The following are a few instances taken from a score or more quoted by Prof. James Law of New York in a paper read before the American Veterinary Medical Association at Omaha in 1898, which indicate that tuberculosis may be contracted by the use of infected milk.

Lydtin gives the following case: Doctor Stang of Amerbach was called to a finely developed five year old boy, the son of healthy parents, with no hereditary taint in their ancestors. The boy died a few weeks later with miliary tuberculosis of the lungs,

and enormously enlarged, tubercular mesenteric glands. At the necropsy it was learned that the boy had habitually drunk the milk of a cow which had been killed shortly before he died and which had shown pulmonary tuberculosis. (Report of Veterinary Congress at Brussels, 1883, page 288.)

The four year old son of Col. Beecher of Yonkers (and great grandson of Henry Ward Beecher) died March, 1894, of tubercular meningitis, and the two Alderney cows which supplied him milk were then proved tuberculous by the tuberculin test and post mortem examination. There was no hereditary taint.

The child of Dr. Brown, U. S. A., and now of Ithaca, was similarly cut off by tuberculosis, having lived on the milk of a tuberculous cow.

Oliver records the case of a twenty-year-old girl, of vigorous health and good antecedents, who contracted a fatal tubercular meningitis, having drunk the milk of cows having tubercular ulcers on their udders and which were found on slaughter to have generalized tuberculosis. (*Semaine Medicale*, Feb., 1892.)

Bailey, of Portland, Me., condemned and made necropsy of a tuberculous cow which furnished the sole milk supply for the family, and found that the wife of the owner, though of sound ancestry, was in an advanced state of consumption. (Ernst.)

Gordon, of Quincy, Mass., records the case of the ten months child of healthy parents and ancestry which had fed on the milk of a cow with advanced tuberculosis, and which died after a few weeks of acute tuberculosis. (Ernst.)

Gage, Lowell, Mass., had an infant patient die of tubercular meningitis. The parents were healthy and surroundings good. It had subsisted exclusively on the milk of a cow, and this milk showed tubercle bacilli, and infected guinea pigs inoculated with it. A second child fed the same milk developed similar symptoms. (Ernst. Report Mass. S. Pron. Agric'i, 1871.)

A Scotch family, strong and healthy, had a herd of cows which contracted tuberculosis. Two young daughters brought up on the milk died of tuberculosis, while the two elder brothers, using little or no milk, remained well and hearty. (Tuberculosis. Nat. Vet. Assn., London, 1883.)

The records of the General Register Office of England, as published by the Royal Commission on Tuberculosis in 1898, show that the deaths from all forms of tubercular disease in England and Wales have diminished 39.1 per cent in the last thirty years, during which time sanitary regulations have greatly advanced. The greater portion of this diminution was in the lung form of tuberculosis, while the decrease in the intestinal form of the disease was but 8.5 per cent and there was an increase in the mortality of infants of 27.7 per cent.

If tuberculosis is only contracted by association with tubercular people, the diminution in the disease in all classes should be the same, but the fact that there is an increase in the death rate of children during the period when they consume the most milk would certainly indicate that milk is a source of infection.

To corroborate this conclusion, Woodhead's analysis of 127 cases of fatal tuberculosis in children states that the mesenteric glands were involved in one hundred, indicating that the germ most frequently gained access with the food rather than with the air breathed.

TUBERCULOSIS IN OTHER STATES AND COUNTRIES.

Until within the last decade but little has been done toward the suppression of tuberculosis. The disease was of such a nature that it could not be detected except in animals in the advanced stage until the tuberculin test was discovered. Since the tuberculin test has proved so reliable it is used almost universally in all countries where live stock sanitation is enforced. Many of the eastern states appropriate and expend from \$1,000 to \$50,000 annually in controlling tuberculosis among cattle. In some localities in the eastern states as high as forty per cent of the dairy cattle proved to be tubercular.

More stringent rules were passed by some states than others governing the admission of dairy cattle. This caused many who had badly infected herds to ship them from the states that had passed stringent rules for the suppression of the disease to states that were less guarded. As a result thirteen states, including Maine, New Hampshire, Vermont, Rhode Island, New Jersey, Pennsylvania, Illinois, Iowa and Missouri, now require that all cattle entering these states, to be used for dairy or breeding purposes, be

accompanied by a certificate indicating that they have been tested with tuberculin and found healthy. This certificate is usually secured from sanitary authorities at point of origin, but may be secured by test at point of entry to states.

The United States government not only holds all importations of cattle in quarantine for ninety days, but requires that they pass the tuberculin test. Nearly all European countries have passed laws for the suppression of tuberculosis among animals. England has a Royal Commission investigating tuberculosis. France, Sweden and Denmark enforce stringent sanitary laws. In Denmark the cream used for making butter is pasteurized and creameries are required by law to heat skim milk before returning it to farmers and to burn separator sediment.

At the Seventh International Congress of Veterinary Surgeons held in Baden-Baden August 7 to 12, 1899, after many papers were read upon the prevention of tuberculosis among animals by leading veterinarians from various countries, the following resolutions were adopted:

THE PREVENTION OF TUBERCULOSIS AMONGST DOMESTIC ANIMALS.

1. The prevention of tuberculosis in cattle is urgently needed.
2. The extinction of bovine tuberculosis on the part of owners (voluntary extinction) is practicable, and should be universally aimed at. It demands the slaughter of dangerous tuberculous beasts as soon as possible, as well as careful protection of calves and healthy animals from infection. The voluntary extinction of bovine tuberculosis should be encouraged by the state, through the dissemination of correct views respecting the character of tuberculosis, respecting the modes of infection and the importance of tuberculin inoculation, and be supported by state grants. The best means hitherto known for the prevention of tuberculosis among domestic animals is tuberculin. Tuberculin should only be supplied under state control. In any case it should be given to veterinary surgeons alone.

3. A state prevention of bovine tuberculosis is thoroughly to be recommended. If it is applied with a certain caution, it can be carried out, and will hinder the further increase of the disease and will gradually stop it. The prevention requires:

(a) The obligation of the veterinary surgeon to give the legal notice of every case of proved tuberculosis in the exercise of his practice.

(b) The quickest possible slaughter of dangerously tuberculous animals (particularly those animals which are affected with metritis, tuberculosis of the uterus and of the intestines, as well as pulmonary tuberculosis), compensation being granted by the state, and the prohibition of the return of buttermilk from the cooperative dairies until it has been sterilized.

TUBERCULOSIS AMONG CATTLE IN ARIZONA.

The amount of tuberculosis in a community is dependent upon, first, the amount of tuberculous germs introduced, and, second, on favorable or unfavorable conditions for their multiplication. Most of the early importations of stock into Arizona were for range purposes, and this class of cattle are not as likely to carry tuberculous germs.

The methods of handling range cattle and the climatic conditions in Arizona as well are not favorable to the spread of tuberculosis nor to the multiplication of that germ in animals affected. As to the dairy stock introduced during later years, will state that a badly tubercular infected herd was brought from California into Arizona before Arizona sanitary laws were enforced. While examining this herd for a prospective purchaser in 1895 several animals were pronounced tubercular. The tuberculin test was applied, which revealed the fact that over fifty per cent of the entire herd were tubercular. Post mortem examination corroborated the test and proved that many had been affected for years. The owner of the cattle, Mr. Rose, who had brought them from California, stated that he was not aware that his cattle were diseased. It was found on further investigation that several cows had lost flesh and died during the two previous years while they were in charge of a renter.

In December, 1893, forty-five head of registered Jersey cattle were shipped into the Salt River Valley from Eolia, Missouri, and sold to Mr. Osborne. They were admitted without examination by the present Territorial Veterinarian, because accompanied by proper health certificates given by the Assistant State Veterinarian of Missouri. Shortly afterward they were examined and several

were found suffering from tuberculosis. All were tested with tuberculin and those reacting, about forty per cent, were destroyed. The balance were retested after ninety days with favorable results and the quarantine was lifted. (For full report of this work see printed report, this office, 1893-4.)

Several other herds, besides individual cows have been tested with tuberculin, either because of suspicious symptoms or for the satisfaction of owners, and in nearly every case the animals were found free from the disease. It has been proved that three of the tubercular cows that have been detected recently, which were owned by Davis Brothers, came originally from the California herd. One tubercular cow was found in a private barn in Phoenix, which apparently contracted the disease from a tubercular person, at least no other source of infection could be discovered. As compared with other States and Territories, Arizona cattle are practically free from tuberculosis, due to the care taken in admitting cattle and to the favorable climatic conditions and methods of handling dairy cattle.

CAUSE AND SYMPTOMS OF TUBERCULOSIS IN CATTLE

As many questions are asked as to symptoms of tuberculosis especially in cattle, a few words of explanation will be given for the assistance of Arizona dairymen and consumers of milk.

Bovine tuberculosis is due to the presence in the system of the tubercle bacillus. Because this germ is often taken into the system without injurious results at the time, people are less careful about taking precaution against its introduction, not only among lower animals but even among healthy people. Nature at all times endeavors to cover up and hold from the general circulation all substances introduced that are injurious, and thus it does with the tubercle germ. It is often held for months or even years in an encysted condition, but whenever the animal's vitality is reduced it is taken into the circulation, and general tuberculosis is the result.

Its effect upon animals is similar to that upon man except that possibly other glands than the lungs are more often affected in them than in the human subject. The records of the United States Bureau of Animal Industry state that 88 per cent of tuberculous animals are affected in some of the thoracic organs, show

ing that the bacilli usually enter the body in a dry condition with the air breathed, though other animals in which the lymphatic glands of the intestines are affected, indicate that the germs must have gained entrance to the body with the food. In many cases the perotid and post-pharyngeal glands of the throat are affected, wherein the germs might have entered the body with either the food or the air.

When the glands of the throat are affected they are enlarged and often cause labored breathing and the animal gives a wheezing sound with each respiration. When the lungs are badly affected the animal will cough, especially when exercised. As the disease advances the animal becomes poor and the hair presents a rough appearance.

Tuberculous animals give off the tubercle bacilli in discharges from the mouth or nose when the lungs are badly affected, in the discharges from the external glands, in the milk, especially when the udder is affected, and in the faeces in advanced stages.

A majority of the best authorities agree that the disease is transmitted to the foetus by the dam before birth only when there is tuberculosis of the uterus, or general tuberculosis in its advanced stages. As to the use of the flesh and milk of tuberculous animals, all have an objection to the use of any of the products of diseased animals, yet of late European authorities have claimed that the meat of animals killed in the incipient stage of the disease is entirely fit for food.

Many experiments have been made in feeding the milk of animals in various stages of tuberculosis, and the concensus of opinion is today that milk from animals in the first stages of tuberculosis with perfect udders does not contain tubercle bacilli. Tubercular animals showing labored breathing, enlarged external glands, disease of the udder or uterus or emaciation should be excluded from the dairy.

TUBERCULIN TEST.

The tuberculin referred to in the foregoing report was discovered by Koch in 1890, and was at first claimed to be a cure for tuberculosis, but later investigation has proved that its greatest use is in assisting in detecting latent tuberculosis, especially

in animals. Tuberculin is the product of the growth of the tubercle bacillus. It is prepared by growing the bacillus in properly prepared veal broth, which is kept a little above the body temperature (98.6 to 102 deg. Fah.) The bacilli are filtered out, leaving a brownish colored liquid.

The tuberculin test is made in brief as follows:

1. Take the temperature of each animal to be tested two or three times at least during the day the tuberculin is injected.
2. Inject each animal with about 2cc. of diluted tuberculin between the hours of 8 and 12 p. m.
3. Beginning nine hours after the injection the temperature of each animal should be taken every two or three hours until the eighteenth hour after the injection, or until the temperature begins to lower.

Care should be taken to see that animals are watered and fed just as at other times and handled with as little excitement as possible. The temperatures are taken the first day to ascertain the normal temperature of each animal. A close record of temperatures for each day should be kept noting also any peculiarities that might cause a rise in temperature. The injection should be made with a sterilized hypodermic syringe. A rise in temperature of two degrees or more on the second day above the highest temperature on the previous day is considered as evidence of tuberculosis.

A few dairymen about Phoenix have at their own expense had their entire herds tested with tuberculin, not only to be able to eradicate disease, but in order to be in a position to assure their patrons that they were furnishing them with milk that was free from tubercular taint. The only entire dairy herd tested within the last two years is owned by Davis Bros. and is located near Phoenix.

In order that all interested may understand more fully the accuracy of the test, a table of temperatures of this entire herd is included in this report. Note the fact that there is very little, if any rise in the temperatures the second day above that of the first except in three instances, and in these the rise is quite marked, two degrees or more.

TABLE SHOWING TEMPERATURES IN TUBERCULIN TEST.

Temperature records of Davis Bros.' herd of dairy cattle, located near Phoenix, tested with tuberculin January 8 and 9, 1900. Tuberculin injected between 10 and 12 p. m. January 8, 1900. Two cubic centimeters of tuberculin, furnished by the U. S. Bureau of Animal Industry, injected in each animal.

No.	Name	Age Years	Wt.	Temperatures Before Injection Jan. 8.			Temperatures After Injection Jan. 9.			
				8	12	3	8	11	2	5
				a. m.	m.	p. m.	a. m.	a. m.	p. m.	p. m.
1	Black Heifer	2	700	101	101.5	102	101.6	101.4	102	101.5
2	Spotted Heifer	3	1000	101.4	102	103	101.4	101.4	101.6	101.6
3	Red Cow	5	1100	100.6	101	101.8	101	101.4	101.6	101.6
4	Spyder	7	1100	100.4	101	101	101.4	101.4	101.2	101.6
5	Littleblue	5	1000	101	102	102	101.8	102.2	102.2	102
6	Hardy	4	1100	100.6	100.8	101.4	100	100.8	101.6	101.6
7	Gussy	6	1100	101.6	102	102	102.2	101.2	102	101.2
8	Jackson R.	6	1100	101	101	101.6	101.4	101.4	102	101.8
9	Babe Spot	6	1100	101.4	101.2	101.2	101.6	102	102.1	101.6
10	Black H.	6	1000	100.2	101	101.4	100	101	104.8	105.2*
11	Black Rose	6	1100	101.2	102	102	101	101	101.6	101.4
12	Thrice Teat	5	1100	101.2	101.2	102	101.2	101.2	101.6	101.4
13	Blossom	3	1000	101.4	102	102.2	100.6	101.8	102	101.8
14	Piggie	5	1000	101.6	101.8	101.8	101.6	101.6	101.8	101.6
15	White Teat	2	800	100.6	101.6	101.6	101.4	101.6	102	101.2
16	Speck	5	1000	100.6	102	102	101.2	102	101.8	101.6
17	Wormel	5	1000	100.6	102	102	101.2	102	101.8	101.6
18	Devil	5	1000	100.8	101.6	101.6	100.8	101.2	101.4	101.8
19	Brindle	6	1000	100.8	101.6	101.6	101.4	101.2	101.4	101.6
20	Spot	5	1000	101.2	101.6	101.6	101	101	101	101.4
21	Little Roan	3	800	101	102	102	101.4	101.4	102	101.4
22	Big Bally	6	900	100.4	101.6	101.5	101	101	101.8	101.6
23	Sucker	5	700	100	101	101	101	102.4	103.8	104.4*
24	S. Heifer	4	900	101	101.2	101.2	101.4	101.4	100.6	101.4
25	Brown Dame	4	800	101.3	101.8	101.6	101.4	102	102	101.4
26	Cactus	5	700	101	102	102	101.4	102	101.6	101.6
27	Big Blue	8	1100	100	101	101	100	103.4	104	105*
28	Red Eye	6	1000	101	100.8	101.2	102	101.4	101.4	101.4
29	Roany	6	1100	101.2	101.2	101.2	102	101.8	101.8	101.8
30	Dry Roan	4	1000	101.4	102	102	102	102	101.6	101.6
31	Red Kicker	6	1000	101.6	101.8	101.8	101.4	101.6	102	101.6
32	Line Back	5	1100	101.4	101.6	101.6	101.4	102	102	101.8
33	Holstein	5	900	99.8	101.4	101.4	100	100.6	101.4	101.2
34	S. Heifer	3	700	101	101.8	101.8	100.6	101	101.8	101.8
35	Bell	4	600	101.4	102.4	102.4	101.8	102.5	102.5	102
36	Red S. H.	5	1000	102	102.6	102.6	101.4	102	101.8	102
37	Red	5	800	101	101.6	101.6	101.4	101.8	101.6	101.6
38	Red	3	800	101.2	101.6	101.6	100.5	101.4	101.6	101.6
39	Red Rosa	5	1000	101.4	101.4	101.4	101.4	101.2	101.2	101
40	Red	5	1100	101.6	102.4	102.4	101	101.6	101.2	101.2

NOTE.—* Indicates animals showing a rise in temperature of more than two degrees on the second day above the highest temperature on the first day, proving them to be tuberculous.

HOW TO SECURE AND MAINTAIN A HEALTHY DAIRY HERD.

1. Carefully test with tuberculin every animal in the herd, removing all showing a rise in temperature sufficient to indicate tuberculosis.

2. If only a slight rise in temperature is found, or it is thought that the rise might be due to other causes, as excitement, heat, nearness to calving, other diseases, etc., the animal should be separated from those showing no reaction and tested again after four or five weeks. These that react at this time should be considered tuberculosis.

3. Disinfect barn or lots where cattle are fed and milked.

4. In making additions to the herd, buy only from apparently healthy herds and avoid animals showing any of the following symptoms: Cough, nasal discharge, enlarged glands in the throat, labored breathing, sores on the skin, diseased udder or scouring.

5. Require that every newly purchased animal pass the tuberculin test before placing it with the herd.

6. If cattle are housed arrange the mangers so that each cow feeds separately and from the same stall each time.

7. Allow no consumptive person to feed, milk or attend in any way around dairy cattle.

SOUTHERN CATTLE FEVER (TEXAS FEVER).

For many years the United States Department of Agriculture has maintained a quarantine line across the southern portion of the United States for the purpose of preventing the fever infected cattle in the South from coming in contact with the non-infected cattle of the North. Under the rules of this quarantine no cattle from below said line can be moved to points above the line except during November and December of each year, and then only to the extreme northern portion unless they are free from fever ticks. Provision is made for shipping fat cattle for immediate slaughter during any month in the year, but they are held in quarantine in in transit.

Since Arizona and New Mexico are the only two divisions of the United States touching its southern boundary line but what are now held in quarantine by the United States Department of Agriculture, and because our Territory is liable at any time to become infected by this ruinous disease through the admission of infected cattle from below the quarantine line, which bounds us on the south and west, it is thought advisable for the assistance of stockmen to give a concise statement of the symptoms of southern fever, and especially something in regard to the much discussed fever tick (*boophilus bovis*) which is the carrier of the disease.

CAUSE AND SYMPTOMS OF SOUTHERN CATTLE FEVER.

Texas fever is now more commonly called splenic or southern cattle fever, because cattle coming from many of the southern states as well as Texas may infect northern or susceptible cattle with the fever.

For many years, or, in fact, until within the last few years scientists have been in the dark as to what was the infective principle in southern cattle fever and how the disease was transmitted from one animal to another. It was noticed that southern cattle were as a rule healthy and that they carried disease only during the warmer part of the year and were harmless during the winter months.

Because the disease was often contracted by cattle that had never come in contact with southern cattle, but had simply been pastured after them or had only crossed their trail, it was thought that the infectious principle, whatever it might be, was deposited by the southern animal in its saliva, urine or faeces. The latter theory, that the germ was deposited with the faeces, was readily accepted by many, because, though the disease developed all along the trail of the southern animal, the greatest losses were sustained at the camping places or where the cattle were held for a time. At these places, naturally, more excrement of all kinds was deposited.

It was finally discovered that there was a micro-parasite (*Pyrosoma bigeminum*) in the red blood corpuscles of the southern animal of malarial origin. This organism or germ, when introduced into the blood of susceptible cattle from the climate where the mercury registers zero (F) or lower, or where the altitude is more than one thousand feet above sea level, multiplies rapidly, attack-

ing and destroying the red blood corpuscles of the affected animal. This breaking up of the red blood corpuscles causes derangement of the vital organs because supplied with degraded blood. This condition of the liver, spleen, kidneys and other vital organs produces high temperature (fever), loss of appetite, and usually death. Whenever but a few of the germs are introduced into the animal, the animal is able to overcome their effect, but if a sufficient number are introduced to cause the breaking up of 60 per cent of the red blood corpuscles of the blood at one time, death results.

The principal symptoms of southern cattle fever are: High temperature (105 to 108 degrees F.), which can readily be detected even by touching the skin of the animal, which will be dry and hot; red urine due to the coloring matter of the broken down red blood corpuscles (haemoglobin) which has been filtered out from the blood of the kidneys; loss of appetite and usually cessation of rumination with more or less constipation, and the faeces passed will be quite hard and sometimes tinged with a red color. A badly affected animal will separate itself from the herd and stand with ears drooped and more or less discharge of mucus from the nose and mouth.

The experiments of the United States Bureau of Animal Industry made during the last six years have proved that the only way that southern cattle fever can be transmitted to susceptible animals is by inoculation, and the only way that it has thus far been proved that this inoculation has been made, except when done mechanically, is by means of the animal parasite known as the southern cattle tick (*Boophilus bovis*).

LIFE HISTORY OF THE SOUTHERN TICK (*BOOPHILUS BOVIS*).

This tick is similar to the common ear tick, found frequently on our mountain cattle, but is found on the body of the animal, principally on the protected parts between the thighs and on the udder of the cow or the scrotum of the steer. That all stockmen may understand fully how this little parasite may carry the germ of the disease from one animal to another, I will give briefly its life history.

We will commence with the young tick just hatched from the egg (larva stage), when it appears as a small, brownish colored insect, having three pairs of legs and measuring about .026 of an inch

long. The tick during this stage of its existence has greater powers of resistance than at any other time, having been known to live for several months without any perceptible change and with no other nourishment than that obtained from the air. They crawl but little laterally, but climb vertically on grass or weeds and remain with their heads uppermost until they come in contact with an animal from whose blood they can procure nourishment for further development. They are provided with a pair of tucklers, one on either side of the head, with which they attach themselves to the skin of the animals, and when once attached never move about on their hosts.

Their mouths are elastic tubes with which they penetrate the skin and draw blood from the veins and arteries of their hosts. It requires from twenty-one to twenty-three days for the tick to mature after it gains access to the body of the bovine. During this period it moults (sheds a coat or shell) twice, the first time at the end of one week, when the fourth pair of legs appears (nymphal stage, tick one eighth inch long,) and again at the end of the second week, when it is sexually mature. Copulation now takes place and the male ticks soon drop off and die, or remain attached without any further change. In removing a mature female tick, the male tick will often be found as a small brown tick about one-tenth as large as the female. The female tick remains attached to its host for several days longer and becomes engorged with blood, causing its elastic skin to expand until it is often one-half an inch long and one-quarter inch wide. After the second moulting or during the last week the female ticks are on their hosts they are easily detected without casting the animal. When fully engorged with blood they will appear as dark, grayish, oblong bodies, only partially covered by the animal's hair. As soon as the female tick drops to the ground it secludes itself under some excreta or other favorable shelter and, if the weather is not too cold, commences to deposit eggs within two or three days. It has been found by experiment that the tick deposits eggs from eight to fifteen days, according to the size of the tick and the time of the year. Each mature tick deposits from five hundred to two thousand eggs and then dies. These eggs appear as reddish brown oval bodies. The eggs will hatch in about three weeks if the weather is sufficiently warm (75 to 85 degrees F.), but they may lie latent for many weeks and then hatch, providing the cold has not destroyed them.

A word as to how the tick transmits the disease. Each female tick before dropping from its host engorges with blood containing fever germs, which are transmitted to each egg deposited, and the young tick, when hatched, still retains the infection. When the animal the tick attaches itself and draws blood sufficient to break the outer shell and then injects back into the veins of its host the surplus blood and at this time infects the animal with the germs of the disease. Microscopical examination of the blood of animals on whose bodies young ticks have been placed has proved that the fever germs were never in the blood until after the first moulting of the tick, which is six or seven days after the ticks are placed on the animal. Thus the germ gains entrance to the blood of susceptible animals and at once begins to multiply and destroy the red blood corpuscles.

Length of time required to develop a generation of ticks under favorable conditions:

From time of depositing eggs to hatching.....	20 to 45 da
From time of hatching to adults on bovine.....	21 to 23 da
Life of generation.....	41 to 68 da

The following are brief answers to some of the questions more frequently asked by stockmen and refer to northern or what is termed susceptible cattle:

About three or four days after the first moulting, which would be about ten or twelve days after the tick gains access to the animal, the fever will be noticed.

The animal will usually die in from five to ten days from the time the fever is first noticed. If several ticks infected the animal about the same time, death will quite likely be the result.

The symptoms of southern fever will be noticed in northern cattle about thirty-seven days after the tick infested cattle are placed in fields with them. The mature ticks that drop from the southern animal the first day deposit their eggs in about seven days. These are hatched, under favorable conditions, in about twenty days, and the young ticks at once crawl onto the susceptible animal. Ten days later the fever will be noticed in the animals to which several ticks have gained access on the first day after hatching. Five to ten days later some deaths will occur. Thus it is plain that it will be from forty-two to forty-seven days from the time the tick

infested cattle are placed with susceptible cattle before the first deaths will occur. Susceptible cattle placed in the same field twenty-seven days after the tick infested cattle will die within fifteen or twenty days, because the young ticks are at this time just hatched and ready to infect them. Susceptible cattle can be pastured with southern cattle twenty days without any danger, but must be removed before there is time for the young tick to hatch from the eggs deposited by the ticks dropped from the southern animal.

An animal may die from an acute attack of southern cattle fever and yet the ticks on its body be so small that they may not be noticed. This is possible because the tick has not had sufficient time to moult a second time (fourteen days), or if moulted, has not grown sufficiently to be easily detected. For this reason the ticks that drop from a northern animal that dies from acute southern fever will often be unable to deposit many eggs. This has led some to believe that the ticks that drop from the northern fever infected animal can not under any conditions transmit southern cattle fever. If the northern animal survives the disease long enough to allow the tick to mature and gorge itself with blood there is no doubt but what the eggs deposited by such ticks, when hatched, will be more or less liable to transmit the disease. They may not always transmit as virulent a form of the disease. Often in the north the cold weather prevents the hatching of a second generation of ticks.

VACCINATION AGAINST TEXAS FEVER.

The greatest hindrance to improvement of Texas and other southern cattle by the introduction of improved breeding stock from the north has been the heavy losses from southern fever among the imported stock introduced. From 30 to 70 per cent of the northern stock shipped into the fever district die from the fever. Many experiments have been made of late in immunizing northern cattle for use in the infected district. Doctor Connaway, Veterinarian, Missouri Experimental Station, and Doctor Francis, Veterinarian, Texas Experiment Station, have made extensive experiments along this line with very satisfactory results. They used two principal methods of immunizing: First, by introducing into susceptible cattle the micro-parasite of the disease by means of tick infestation. Second, by introducing the micro-parasite by

inoculation with the infected blood. In the report of these experiments issued October, 1899, the following statement is made as to results:

"Immunization by tick infestation can be employed with success, but on account of maintaining a quarantined pasture and the necessity of hand feeding in the case of calves of non-immunized cows, this method is not as desirable as that of blood inoculation.

"In the blood inoculation experiments over four hundred pure bred cattle have been used. The losses from inoculation and subsequent exposure to infected pastures in Texas have been less than 8 per cent.

"From the experiments before us we conclude that in careful hands and with proper management preventive inoculation is a reasonably safe and practical measure against the fatal type of Texas fever."

DIPPING SOUTHERN CATTLE TO FREE THEM FROM TICKS.

The United States Bureau of Animal Industry has been carrying on experiments for several years endeavoring to find a mixture in which ticky cattle may be dipped which will free them from ticks, in order that they may be shipped north and placed with susceptible cattle without danger of infecting them. The results have not yet been entirely satisfactory. When a dip was used that would entirely free the animals of ticks often its effects were very detrimental to the animals dipped, especially if they were not in good physical condition. When milder dips were used it was found that the young ticks, especially those about to moult, were not destroyed and would mature. The most satisfactory dip thus far tried is a saturated solution of sulphur in extra dynamo oil, but even this has not been positively endorsed by the Department of Agriculture. Some have thought that the only successful method will be to use a mild dip and repeat it again after 10 or 12 days, taking care that the animal is not exposed to re-infection between dips. The Department of Agriculture's recent report states in this connection: "While it has proved a difficult task to find a liquid that will answer these conditions, there are some which are so nearly satisfactory as to inspire hopes that success in this line will in the near future be achieved."

ACTINOMYCOSIS (LUMPY JAW).

As this disease is occasionally observed among the cattle of Arizona, a word of explanation is in order. Many stockmen have thought the disease to be contagious and have often adopted radical measures to stamp it out.

Lumpy jaw is due to the introduction and multiplication in the system of a certain fungus called actinomyces, which usually gains entrance to the animal with the food through some abrasion in the mucous membrane of the mouth. These germs sometimes attack the tongue or lungs, but more often affect the jaw bones, causing a large, hard tumor, which in time will break, discharging yellow pus, and the cavity thus formed is soon filled with a fungus growth.

There are many cases on record where the germ has been found in man, producing symptoms similar to those observed in cattle. Because often several animals are found in the same herd suffering from lumpy jaw many have thought the disease contagious, but this is likely due to animals eating from the same infected feed. An animal can be inoculated with the germ, but it is not considered a contagious disease. An animal that is badly affected and discharging freely from the tumor should not be allowed to run with other cattle, because there is a probability of their picking up the germ with their feed.

TREATMENT.

Formerly it was thought that lumpy jaw could not be cured unless the entire tumor could be removed by surgical operation, but in 1892 M. Nocard made known to the veterinary profession that most cases of actinomycosis could be cured easily and permanently by administering potassium iodide. The United States Bureau of Animal Industry has since proved conclusively that the results of this line of treatment were satisfactory. It is advised to give from one to two drachms of potassium iodide twice a day in the animal's feed or dissolve in a little water as a drink. This should be continued about a week or until the animal shows the effects of the iodine by a discharge from the nose and eyes, then reduce the dose to about one-half and continue for another week or ten days, when the animal will usually be cured.

DISEASES AMONG HORSES.

Many scores of requests have been made during the two years for the assistance of the Territorial Veterinarian in the diagnosis of diseases among horses. Glanders, distemper, cerebro spinal meningitis and mange were the principal diseases encountered. Horses suspected of having glanders have been examined in Navajo, Yavapai, Maricopa, Yuma and Pinal counties, and glanders was detected in the last three named counties. When glanders was found the owners of the affected horses were thoroughly advised as to the danger of the disease, not only to horses, but to man, and the importance of stamping it out, and in every case the hearty co-operation of the owners was secured, though they received no remuneration for their horses destroyed.

With glanders the most radical measures were adopted, destroying and burning those affected and testing with mallein or quarantining those exposed to the disease until their true condition was positively known. As the other diseases are not necessarily fatal and are not communicable to man only such advice was given as would tend to prevent the spread of the disease.

GLANDERS.

In my report for 1893-4 I gave fully the history of the outbreak of glanders among the horses of Mr. Barkley and others in the vicinity of Tempe and Mesa, during which time fifty glandered horses and mules were destroyed. Though many horses have since been examined in that community not a single case of glanders has been found, proving that the disease can be entirely stamped out. In 1898 eight horses and two mules affected with glanders were destroyed in the neighborhood of Phoenix, but nearly all of these cases could be traced to one glandered horse, which was supposed to have been driven into the Territory from Utah or California.

During the past two years 581 head of horses and mules have been examined and eight horses and three mules have been destroyed because affected with glanders.

The history of these cases is in brief as follows:

February 2 and 3, 1899, examined and tested several suspicious horses owned by Mr. Mulcahy at Phoenix and found one

affected with glanders. Two mules owned by Mr. Mulcahy in very bad condition were destroyed in my absence by direction of the Board.

March 14, 1899. At the request of Mr. Christiansen of Tucson, examined one gray horse owned by him, which was found to be suffering from glanders. The animal was shot and the carcass burned. This horse was taken from the stable and had been running in a small pasture with two or three other horses since it had shown aggravated symptoms of the disease. I examined these horses and many others owned by Mr. Christiansen and parties in the neighborhood, but found none presenting symptoms of glanders until June 7, 1900. At this time I tested with mallein three horses owned by Mr. Christiansen that presented suspicious symptoms with the result that one gave the characteristic reaction for glanders. This animal was also destroyed and the premises disinfected.

April 17-19. Tested with mallein a black horse owned by Mr. Lount, which had been used on the streets of Phoenix for years, the result showing the animal to be glandered.

February 14, 1900. Condemned one glandered mule owned by Mr. J. Cottrell of Alhambra and tested eight horses that were running with this mule. One bay horse proved to be glandered and was destroyed.

June 26. At the request of Mr. V. Westfall and Mr. D. C. Rose of Yuma, I visited their ranches near Yuma and inspected fifteen horses, finding one glandered horse on each ranch. I also advised Mr. Westfall to keep one sorrel mare that presented symptoms of glanders, separate from his other horses.

August 9. Visited Yuma and tested Mr. Westfall's suspicious mare with mallein, proving her to be affected with glanders. On investigation it was found that the first two horses killed for Westfall and Rose were driven into the Territory from California by the same party in December, 1899.

These condemned animals were destroyed by the Territorial Veterinarian according to law and burned at an expense to the Territory of from \$2.50 to \$6.00 per head, according to the circumstances under which the work was done.

A California horse was driven into Holbrook early last year in very poor condition, and afterwards died, presenting, according to the statements of good horsemen, symptoms of glanders. A horse that worked with this animal also died presenting similar symptoms. These horses were not seen by the Territorial Veterinarian, but another horse owned by the same party, that presented suspicious symptoms, was quarantined for a time.

The above history will convince anyone how important it is for all to assist in detecting the first appearance when introduced.

CAUSE AND SYMPTOMS OF GLANDERS.

Glanders is a specific contagious disease due to a micro-organism called bacillus-mallei. It is most frequently found affecting the equine species, but may be transmitted to men and many of the domestic animals, including the dog, cat, sheep and swine. Cattle and fowls are proof against this disease. Because of its being communicable to man, and the loathsome nature of the disease, it is among the most dreaded of all maladies.

The best authorities now agree that glanders cannot originate in any case spontaneously, but must always arise from the transmission of the disease germs from an affected animal to a healthy one either directly or from its affected deposits.

Though the disease may show itself in several forms, two only are recognized, glanders proper, and "farcy," either of which may present itself as acute or chronic. When sufficiently developed to be recognized by the experienced, glanders will usually display some of the following symptoms:

1. A gluey discharge from one or both nostrils of a grayish color, sometimes streaked with blood which adheres to the hair of the nostrils, accumulating dust and presenting an extremely filthy appearance. There is not as much discharge in a case of glanders as in a case of distemper, nor is the discharge as yellow and pus-like.

2. Nodules or pit-like ulcers are formed on the mucous membrane lining the nostrils on the side affected by the disease, mainly on the septum-nasi, or partition between the nostrils. These ulcers are first red, then yellowish, and finally break down, discharging a yellowish, gluey liquid, which contains the germs of the

disease. These ulcers may be so numerous that they unite, causing a sloughing raw surface, and in advanced cases the destruction of the cartilage, while an extremely offensive odor is the result.

3. The glands between the sub-maxillary (lower jaw) bones at the angle, may be swollen somewhat and very hard and painful to the touch. They may vary in size from one day to another, but there is no tendency to suppurate as in distemper. There are many diseases that present similar symptoms but none which display the ulcers on the mucous membrane.

Only a well developed case will present all the above symptoms. There are many cases which cannot be detected by the most skillful veterinarian, and in those only time or the inoculation experiment can positively settle the question of the identity of the disease

The "farcy" form of the disease presents principally small hard swellings from one-fourth to one inch in diameter, located in rows following the course of the lymphatic vessels along the inner side of the thighs and forelimbs, and on the neck, but they may appear on other parts of the body. These swellings or buds will usually form pus and break, discharging a yellowish fluid which has a tendency to stick to the hair. The ulcers formed by the breaking and discharge of these buds have a ragged edge with a dark, unhealthy bottom, which in time, heals, leaving a small scar. Few horses die of farcy, but are usually finally destroyed by an acute attack of glanders proper.

Both farcy and glanders proper are manifested in acute and chronic form, but the principal difference lies in the length of time which elapses before aggravated symptoms appear. It is thought by many that farcy differs from glanders in that it is curable, but it should be remembered that a true case of farcy, though in many cases may be treated with an appearance of success, is as incurable as the more malignant form of glanders, as both forms are due to the same germ, and a horse suffering from farcy may transmit glanders to other animals with which it is brought in contact, and vice versa.

The equable and temperate climate, especially of southern Arizona, is favorable to the health of horses and often glanders

assumes the chronic form and the affected animal shows but little if any symptoms of the disease. Only a slight discharge from the nostrils and at times none at all, and the animal will be apparently in healthy condition and remain so for months and even years. Though such an animal is not as liable to infect others as one presenting the acute symptoms, yet at the same time it is often spreading the germs which produce the acute form of the disease in other animals. This fact often makes it hard to convince owners that their horses are suffering from glanders for they or their friends have seen horses suffering from glanders in some of the cold northern states where the disease usually assumes the more aggravated and acute form, when it can easily be diagnosed by any one familiar with the diseases of horses.

As proof that we should continue to guard well against this disease getting a foothold among our horses, especially on the open range, will state that the sanitary authorities of the state of Massachusetts destroyed during 1899, 543 head of glandered horses and that in a state where sanitary laws have been enforced for years. Dr. Knowles, state Veterinarian of Montana, states that five per cent of the horse population in certain counties in that state are affected with glanders.

The records show the loss annually of many human lives from glanders contracted while treating horses suffering from the disease. Horse traders and emigrants traveling through the country quite often spread this disease in a way that it is hard to trace. Such importations enter the Territory overland without reporting to the Territorial Veterinarian, and it may be months before the disease is discovered by the veterinarian, and it may then be found affecting some native horse that has contracted it from a diseased horse that passed through the Territory. Attention is called to this source of infection so that stockmen will be on their guard when buying or trading for such horses, and will also report to the Sanitary Board or Veterinarian any suspicious horses they observe. In some instances railroad and canal grading outfits unknowingly harbor glanders among their horses. It is always advisable not to feed and water large numbers of work horses from the same troughs or buckets and never to interchange nosebags.

DISTEMPER IN HORSES.

Distemper or strangles is a common disease so often confused with glanders, and for the assistance of horsemen a few of the principal symptoms of distemper and points of difference between the two diseases will be given.

Distemper is an infectious disease affecting principally young horses. One attack usually protects the animal from the disease in the future.

Symptoms—The animal will act sluggish, usually eating but little, and though drinking often will take but a little at a time. It will show signs of fever by quickened breathing and redness of the mucous membrane of the mouth and eyes. Soon a cough will begin and a watery discharge from the nostrils will be noticed, which will become thicker and increase in quantity as the disease advances. Usually a swelling under the jaw will appear which will often become quite large, forming pus, and finally break, discharging freely.

TREATMENT.

The animal should be well nursed from the first, and, as the throat is often swollen, given food that is easily swallowed and that will also tend to loosen the bowels. Keep the patient in a warm place, if possible. As soon as the throat begins to swell a poultice or mild blister applied to the enlarged parts will lessen the suffering and hasten the formation of pus. As soon as pus is formed the tumor should be opened, not waiting for it to break as the delay often allows much of the poison to be absorbed, causing abscesses in other portions of the body. A tablespoonful of hyposulphite of soda twice a day in the animal's drinking water will assist in keeping the blood in healthy condition. After the abscess breaks the animal usually recovers very rapidly and soon all the discharges stop.

In glanders, except in the last stages, the discharge from the nostrils is not extensive, and at times will almost stop, but again appear. The glands of the throat will be enlarged somewhat and hard and painful to the touch, but there is no tendency for them to form pus and discharge. In glanders a slight discharge of blood from the affected nostril will often be noticed, while in dis-

temper this symptom never appears unless it is just when an abscess breaks internally.

MANGE.

This affection of horses so common in the warmer portion of the United States, is especially common in parts of Arizona. Nothing has been done here in a systematic way towards its eradication. Some of the more northern states, where the disease has been introduced by the importation of southern horses, are enforcing sanitary measures to suppress it. The disease is caused by the presence of an extremely small parasite or mite called *Sarcoptes acariasis*, which can be seen in the scabs of the skin with the aid of a magnifying glass. The symptoms are an itching of the affected parts, which are most frequently the mane, tail or back, but any portion of the body may be affected. The animal will rub the affected parts, which in time causes loss of hair.

The principal point to observe in treating the disease is to apply the treatment to the entire exterior of the affected animal in order to be sure to destroy all the parasites, for if any are left they will soon multiply. The crusts should be softened with soap and water, which should be followed by an antiseptic wash. This treatment should be repeated every ten or twelve days for a time to be sure and destroy all the young mites that may have hatched.

CEREBRO-SPINAL MENINGITIS.

This disease has appeared several times in the Salt River Valley, causing the loss of from twenty-five to forty per cent of the horses on certain ranches, but it has never spread to adjoining ranches. It is not usually classed as a contagious disease and authorities are not agreed as to its cause. It would appear in the outbreaks here that the cause was in the condition of the feed.

The first symptom noticed is loss of control of the voluntary muscles, staggering gait, and by the second or third day, inability to swallow. This is soon followed by complete paralysis.

Out of a herd of 125 affected by cerebro-spinal meningitis nearly fifty succumbed to the disease. Those that were removed from the field where the disease was contracted before they were badly affected usually recovered with the aid of physics.

DISEASES OF SHEEP.

As there is a law on the statutes of the territory placing the enforcement of the sanitary regulations governing sheep in the charge of sheep inspectors in various counties appointed by the Governor instead of the Sanitary Board and Territorial Veterinarian, little could be done for the sheepmen through this office. Many letters have been received and questions asked by sheepmen about certain diseases affecting the sheep of the territory. Advice has been given, but no definite work has been accomplished.

I visited Williams February 1, 1900, at the request of Dr. Perrin and examined his sheep. He was losing them quite rapidly at the time, and as he had found worms in the heads of some of them that had died, he thought that this might be the cause of the loss and wanted the matter investigated. On examination of the sheep by trephining through the frontal bone of the head I found the grub worm (*Oestrus ovis*). Though this worm is injurious to sheep and when present in large numbers may cause death, yet they as a rule simply produce some irritation and draw nourishment. When sheep are in poor condition from lack of feed or exposure the presence of these or any parasites is much more serious.

Investigation found that most of the sheep that Dr. Perrin was losing were bucks, which were extremely poor from lack of good grazing during the previous summer and from over-breeding without special feed during the winter. The "Grub in the Head" under these conditions was quite injurious, producing an offensive discharge from the nose. The sheep were fed grain with very satisfactory results.

For the assistance of sheepmen who are not familiar with the life history of "Grub in the Head" and the parasite which causes scab in sheep I give the following brief statements:

GRUB IN THE HEAD (*Oestrus Ovis*).

The "Sheep gadfly" is a small and very active fly, which is seldom seen, but has found its way into every country where sheep are raised. The fly does not deposit eggs, but live young in the nostrils of sheep. The young larva (worm), with the aid of hooks, makes its way up the nostrils and attaches itself in the cavities of the head, where it matures into what is known as the "grub." The

mature grubs are about three-fourths of an inch long and two-thirds of an inch wide. They produce some catarrhal discharge, which has led to the term "snot-nose." These worms in this climate can be found in various stages of growth at any time of the year. The mature grubs drop from the nostrils in cold climates in the spring and bore into the ground. In from four to seven weeks, according to the weather, these worms develop into young flies, which will appear and again torture the sheep while depositing their young.

SCABIES.

Scabies is the disease that has caused far greater loss to flock owners in the country than any other disease. It not only cause the loss of wool and often the death of sheep, but much expense in regularly dipping sheep, because they so easily became reinfected by crossing the trail of infected flocks.

The disease is due to the presence on the skin of minute insects, which spend a portion of all their life history on the sheep. There are three species affecting sheep: *Sarcoptes scabiei*, affecting the head; *Shoriptes communis*, affecting the feet, and *Psoroptes communis*, the common scab mite, affecting the body of the sheep.

The common scab mite is visible with the naked eye, and may be found under the crust or scab it produces. The insect bites its host and a serous fluid exudes, which in time forms a crust of yellowish color. The mites deposit eggs under these crusts, which hatch in two or three days and mature in fifteen days. It is estimated that each adult female deposits about fifteen eggs, two-third of which are females.

Gerlach, a scientist, estimates that a single female in ninety days would produce 1,500,000 progeny.

He gives the following table:

	Females.	Males.
First generation after 15 days produces.	10	5
Second generation after 30 days produces.	100	50
Third generation after 45 days produces.	1,000	500
Fourth generation after 60 days produces.	10,000	5,000
Fifth generation after 75 days produces.	100,000	50,000
Sixth generation after 90 days produces.	1,000,000	500,000

This host of young parasites migrate into new territory and thus the crusts enlarge. The sheep will often rub off pieces of the crusts, or they will drop off with the wool, and other sheep coming in contact with these deposits will become infested, and the disease continues to spread.

These crusts are often left in railroad and other corrals where they infest all sheep placed in them; thus it is almost impossible to keep a flock free from scab where there are any scabby sheep in the neighborhood.

Many have claimed that scab in sheep is a necessary evil, and that it would always be necessary to dip sheep once or twice a year. If the mites were all destroyed there would be no necessity to dip again unless new infection was introduced.

TREATMENT.

Many mixtures of tobacco and various forms of carbolic acid, sulphur, etc., have been used to destroy scab mite. The success of any of these mixtures depends mainly upon the thorough and efficient way in which they are used.

Below we quote regulations issued by the United States Department of Agriculture, prohibiting the shipment of scabby sheep from one state or territory to another, in which will be found the dips now approved by that Department. If sheep are badly affected or if the wool is long they should always be dipped a second time, ten days after the first, taking care to see that they do not become reinfected between the dippings:

(B. A. I. Order No. 38.)

REGULATIONS CONCERNING THE DIPPING OF SHEEP AFFECTED WITH SCABIES.

U. S. Department of Agriculture,
Office of the Secretary,
Washington, D. C., July 20, 1899.

Whereas, The shipment of live stock affected with any contagious, infectious, or communicable disease from one State or Territory to another, or from any State into the District of Columbia, or from the District into any State, is prohibited by the act of Congress approved May 29, 1884; and

Whereas, The contagious disease of sheep known as scabies, or scab, exists in many parts of the United States, due notice of which was given in the Department order of June 18, 1897; and

Whereas, Some of the preparations in which diseased sheep have been dipped by owners and stockyard companies, with the object of destroying the contagion and making legal the shipment of said sheep in interstate trade, have proved inefficient, and said sheep have disseminated the contagion notwithstanding such treatment; and

with others so affected, shall be allowed shipment from one State or

Whereas, The damage and losses from scabies in sheep have been in some sections very heavy and discouraging to those engaged in the sheep industry;

It is ordered, That from and after August 10, 1899, no sheep infected with scabies, and no sheep which have been in contact Territory into another, or from any State into the District of Columbia, or from the District into any State, unless said sheep shall have first been dipped in a mixture approved by this Department.

The dips now approved are:

1. The tobacco-and-sulphur dip, made with sufficient extract of tobacco to give a mixture containing not less than five one-hundredths of one per cent of nicotine and two per cent flowers of sulphur.

2. The lime-and-sulphur dip, made with eight pounds of unslacked lime and twenty-four pounds of flowers of sulphur to one hundred gallons of water. The lime and sulphur should be boiled together for not less than two hours, and all sediment allowed to subside before the liquid is placed in the dipping vat.

The owner of the sheep is privileged to choose which one of the above mentioned dips shall be used for his animals. The Department will instruct inspectors to enforce due care in dipping sheep, but it assumes no responsibility for loss or damage to such animals, and persons who wish to avoid any risks that may be incident to dipping at the stockyards should see that their sheep are free from disease before they are shipped to market.

JAMES WILSON, Secretary.

SWINE.

There has been less disease among the swine of the Territory the past two years than at any time since this industry was started. Hog cholera is still unknown among Arizona swine and will continue to be, if proper precautions are taken in admitting swine into the Territory to prevent the introduction of the deadly cholera germ. All swine breeders should be willing to comply with rigid rules and guard against the introduction of cholera.

Light outbreaks of swine plague have been located a few times during the past two years. The owners were advised to separate the healthy from the diseased hogs and to give them the best of care. In all instances the disease was soon controlled. Swine plague has caused but little loss in the Territory since 1895, when it was estimated that the swine breeders of the Salt River Valley lost upwards of \$50,000 from the ravages of this one disease. Though the disease spread that year on to more than sixty ranches, yet by radical measures it was entirely stamped out.

Though hog cholera and swine plague are equally fatal to swine and present many similar symptoms, yet they are two separate diseases and a word of explanation may assist some.

HOG CHOLERA AND SWINE PLAGUE—TWO DISEASES.

Hog cholera and swine plague were long thought to be identical, but it has been demonstrated that they are separate and distinct diseases. Both are due to bacteria, and one is as destructive as the other, but hog cholera germs are very hardy and vigorous, can live in the soil at least three months, and are able to live and multiply in the water of springs and ponds; they also withstand drying and extremes of temperature. On the contrary the swine plague germs are delicate and easily destroyed. They perish in water and cannot stand extremes of heat or cold. Swine plague germs may be present in herds of swine without developing the disease, unless some unusual conditions increase their vigor or lower the disease-resisting power of the animal.

The visible symptoms of the disease are so familiar that even experts find it difficult to diagnose a case with certainty. However, a few facts remembered will help in arriving at a conclusion. The germs of hog cholera are usually taken into the system with the food and therefore generally affect the alimentary canal

first, producing inflammation of the intestines and in advanced cases ulceration of the large intestine, similar to the effect of typhoid fever in man. This may be followed by inflammation of the lungs. On the other hand the germs of swine plague are generally breathed into the lungs, and the first effect is therefore an inflammation of the lungs, which is sometimes followed by inflammation of the intestines.

As hog cholera is never developed spontaneously, but is always directly communicated from infected hogs, and the germs being so vigorous may be transmitted a long distance through adhering to the hair of dogs or the shoes or clothing of men, it can readily be seen that all reasonable precautions should be taken against the introduction of the disease, and a rigid supervision should be exercised over imported stock.

PREVENTIVE INOCULATION.

Experiments to secure a material with which pigs can be inoculated causing them to be immune from attacks of cholera and plague have been made by the United States Bureau of Animal Industry experimental stations in Ohio, Nebraska, Kansas and other states with quite satisfactory results. These vaccines should not be used except where there is danger of hogs being exposed to the disease. As long as Arizona hogs are free from cholera and the plague so seldom appears it would not be wise to commence the use of vaccine.

QUARANTINE CORRALS, ADMISSION OF STOCK, ETC.

The rules of the Board require railroad companies to report to the Territorial Veterinarian all shipments of live stock entering the Territory, stating the origin and destination of the shipment and whether or not accompanied by a certificate of health. Permission to enter is granted either with or without restrictions if accompanied by proper health certificate, when they are either inspected by the Territorial Veterinarian or refused admission.

In order to enable the safe shipment of southern cattle from points below the United States quarantine line through Arizona to other points below the line, a portion of the Arizola and Yuma corrals on the Southern Pacific, and the Peach Springs corrals on the

Santa Fe railroad have been set aside as quarantine corrals and are not used for handling our native stock.

During the past two years the officials of the two railroads entering the Territory have carefully complied with every sanitary regulation made; reported every shipment of live stock before it entered the Territory, and held it until given instructions as to the handling of the same.

I am glad to be able to report that on account of this co-operation in the enforcement of systematic rules for the admission of live stock no diseased animals have been shipped into the Territory during the past two years.

RULES FOR DISINFECTION.

The following rules for disinfection are recommended for the use of stockmen wherever there is the slightest suspicion of the presence of a contagious disease:

1. Have all straw and rubbish that has been in contact with the diseased animal burned, together with the stall and the building in which the animal was confined, if the latter is not an expensive one.

2. Where the animal has been kept in a good barn, remove all filth and rubbish, and wash all woodwork with water containing from one to two ounces of carbolic acid to the bucket. Then whitewash all exposed parts with limewash containing one ounce of carbolic acid to the bucket.

3. When glanders has been present, all harness, neck yokes, etc., should be cleansed with boiling water, then dipped in oil containing once ounce of carbolic acid to the quart of oil. Care should be taken not to burn the hands in this latter solution.

4. We have obtained good results from the use of a swab which is first saturated with kerosene, then ignited and held against posts, etc., until the outside is burned off. Sometimes the oil is poured upon the wood. In this way all germs are effectually destroyed. This will work especially well in a dry climate.

Cars and Corrals—The cars used to transport infected animals and quarantine corrals should be disinfected in the following manner:

(a) Remove all litter and manure. This litter and manure may be disinfected by mixing with lime or saturating it with a five per cent solution of 100 per cent carbolic acid, or it may be thoroughly burned.

(b) Wash the cars and feeding troughs until clean.

(c) Saturate the walls and floors of the cars and the fencing troughs and chutes of the pens with a solution made of one and one-half pound of lime and one-fourth of a pound of (100 per cent) carbolic acid to each gallon of water; or a solution made by dissolving four ounces of chloride of lime to each gallon of water. The cars may be disinfected with a jet of steam under a pressure of not less than fifty pounds to the square inch.

NEW SANITARY LAWS.

From various reports received from sheepmen over the territory it would seem that the present sheep laws might be improved. The scheme of having a sheepman appointed in each county as inspector who shall keep close watch for violation of laws is good but there should be some authority, who has charge of and assists in this work over the entire territory. This authority could be given to a special sheep commission, the Sanitary Board or the Territorial Veterinarian. This is especially important in enforcing sheep laws for this class of stock is often shipped or driven from one part of the territory to another, and these movements can only be systematically regulated by some authority who has charge of the entire work.

Nearly all states are now enforcing stringent laws for the protection of dairy stock and the consumers of dairy products, allowing only healthy cattle to be used in dairies. Unless Arizona has stricter laws enacted for the detection and suppression of disease among this class of animals, questionable cattle in the dairies of other states may be shipped into Arizona.

If Arizona had a law requiring the inspection, by the Territorial Veterinarian, at least once a year, of all stock in dairies furnishing milk to cities and towns in the Territory of five hundred or more inhabitants, it would not only lead to the detection of any disease now existing in our dairies, but be the means of locating any diseased animals that might be brought into the

Territory before the infection was allowed to spread. At this inspection investigation should be made in regard to sanitary conditions of dairy barns, healthfulness of the water supplied to dairy stock and the methods of handling dairy products.

TO DETERMINE AGE OF CATTLE.

Where cattle run at large on the range as in Arizona it is necessary to ascertain their ages by examination, and as I have received many letters from inspectors and cattlemen asking for rules for determining the age of cattle by their teeth I give the following brief data on this subject:

The time of the appearance of teeth varies much according to the development and kind of feed supplied the animal, but a more definite knowledge of the age of an animal can be obtained from the teeth than in any other way. The age is determined mainly by the appearance of the incisor teeth, which in the bovine are only found on the lower jaw. There are eight incisor teeth in the ox, which are named as follows: The two middle incisors are known as pinchers, the next ones on either side as first intermediate or middles, the next as second intermediate or laterals, and the outside ones as corner teeth. They appear in pairs in the order named.

The ox has two sets of incisors called temporary or milk teeth and permanent teeth. The milk teeth are small and have short roots. Two pairs of temporary teeth, pinchers and first intermediate, appear at birth or within a few days. The second intermediate teeth at about ten or twelve days and the corner teeth when the animal is from three to four weeks old. These teeth are all replaced by permanent teeth at the following times: The pinchers appear when the animal is from eighteen to twenty months old and are in place at two years. The first intermediate (middles) teeth appear when the animal is about two and a half years old and are in place at three years. At three and one-half years the second intermediate (laterals) teeth appear and are in place at four years. The permanent corner teeth appear when the animal is from three years and nine months to four years and six months old, making a full mouth at five years.

As these ages are those most disputed among cattlemen I will not endeavor to explain the variations in the appearance of the teeth as age advances due to their wearing away.

SUMMARY.

During the past two years in connection with the admission of live stock, quarantining, etc., 275 telegrams have been received and 350 telegrams and sanitary orders issued.

During 1899, 3,814 head of cattle and 206 head of horses and in 1900, 3,945 head of cattle and 375 head of horses as well as several thousand head of sheep and hogs were inspected by the Territorial Veterinarian.

One thousand and fifty sanitary letters have been written and nearly the same number received during the two years.

Respectfully submitted,

J. C. NORTON,
Territorial Veterinarian.

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