1971

THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA

Parliamentary Standing Committee on Public Works

REPORT

relating to the proposed construction of a

BRUCELLA VACCINE TESTING LABORATORY

at

Canberra, A.C.T.

(SEVENTEENTH REPORT OF 1971)

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PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

BRUCELLA VACCINE TESTING LABORATORY
CANBERRA

REPORT

By resolution on 28 September 1971, the House of Representatives referred to the Parliamentary Standing Committee on Public Works for investigation and report to the Parliament, the proposal for the construction of a Brucella Vaccine Testing Laboratory at Canberra, A.C.T.

The Committee have the honour to report as follows:

THE REFERENCE

1. The proposal referred to the Committee is for the construction of a Brucella Vaccine Testing Laboratory in the Canberra suburb of Narrabundah. The work involves the construction of a gate house and a building which will contain an animal breeding house, and a testing laboratory. The complex is to become the first stage of a permanent building complex for the National Biological Standards Laboratory.

2. The work is estimated to cost $870,000.

THE COMMITTEE'S INVESTIGATION

3. The Committee received written submissions and drawings from the Departments of Health and Works and took evidence from their representatives at public hearings in Canberra. Evidence was also taken

from representatives of the National Capital Development Commission and the Commonwealth Serum Laboratories, and a written submission was made by Arthur Webster Pty. Ltd., a manufacturer of biological products.

4. We also inspected the site for the proposed work.

NATIONAL BIOLOGICAL STANDARDS LABORATORY

5. The Therapeutic Goods Act 1966 empowers the Commonwealth to set standards for therapeutic goods for human and veterinary use that are supplied to the Commonwealth or are the subject of trade or commerce. The Minister for Health may determine standards relating to the composition, strength, potency, stability, quantity, quality or method of production of such goods. Standards applicable to brucella vaccines are specified in the 1970 Supplement to the British Veterinary Codex.

6. The National Biological Standards Laboratory, a division of the Commonwealth Department of Health, has been appointed under the Therapeutic Goods Regulations as a laboratory for examining, testing and analysing and thus is the appropriate Commonwealth authority to test brucella vaccine.

BRUCELLOSIS IN AUSTRALIA

7. Losses Through Disease The presence of brucellosis in cattle in Australia renders our beef and dairy exports vulnerable to the increasingly stringent inspection requirements imposed by the significant importers of these goods. The growing impetus towards brucellosis eradication in developed countries which are generally our major customers, has resulted in health certification of exports becoming more exacting.

8. In 1970/71, the value of veal and beef exports was $305 million, of which the United States and Canada took $226 million, most of the remainder going to European and Japanese markets. In the same year, dairy exports totalled $110 million, of which the United Kingdom received products valued at $34.5 million. Instances have already arisen where the meat trade with northern America has been disrupted by more stringent health requirements and the Committee were told that Australia's interests would be difficult to defend unless it can be shown that significant eradication measures are being taken.

9. Limited blood testing of dairy and beef cattle in Australia has revealed evidence of brucellosis infection in about 50% of herds tested. The disease is endemic throughout Australia except in Tasmania where a favourable situation has been achieved. A reliable estimate of its real incidence will not be fully known until the results of a current survey are available at the end of 1971. Apart from the export considerations, brucellosis is responsible for considerable local economic losses in the livestock industry and is a public health hazard. A 20% reduction in milk production and a 15% loss in the annual calf drop in unvaccinated herds may occur and during severe outbreaks calf losses can reach 50%.

10. Eradication Campaign The campaign against bovine brucellosis being mounted jointly by the States and the Commonwealth was first discussed by the Australian Agricultural Council in 1966. The outcome of these discussions and subsequent investigations and actions was a decision by the Commonwealth to assist in financing the campaign on the basis of matching the annual combined expenditure by the mainland States and all costs in Tasmania in excess of the first $50,000. The States

for their part undertook to at least maintain the 1968/69 level of eradication activities and intensify them where possible. The provision of a facility, as part of the National Biological Standards Laboratory for the safety and potency testing of brucella vaccines was seen as an urgent and basic facet of the decision.

11. The campaign which was commenced in January 1970, involves initially the compulsory vaccination of heifer calves between the ages of three and six months in dairy and beef herds which are within or adjacent to districts mainly occupied by dairy farms. Vaccinations will also be made of accessible beef herds elsewhere. This is to be the first step towards eradication by reducing the disease incidence to a level where testing and slaughter of reactors would be feasible. It has been decided that to gain full and effective participation by producers, vaccination should be free of charge.

THE NEED FOR TESTING OF BRUCELLA VACCINE

12. The campaign commenced in advance of any testing of the brucella vaccine for several reasons, viz.

- the importance of eradication is such that there should be no delay in at least attempting to reduce the incidence of the disease;
- vaccination campaigns on a small scale by some States, particularly Tasmania, have been generally effective;
- the view was held that whilst an early commencement could provide useful protection because of the campaign's national aspect, a vaccine testing facility should be provided as soon as possible; and

- the first triennium of the campaign involved only the gradual build-up of vaccinations to the proposed annual level.

The campaign is to be carried out on a geographic area basis with teams moving on completion of vaccinations from one area to another. Vaccine usage each year will be more or less constant at 1.3 million doses. The cost to the Commonwealth in the first triennium is expected to be $4,060,000.

13. The main need for testing is that a national campaign requiring the large scale use of vaccines has not been attempted before. Should impotent material be unknowingly used on such a scale and not be discovered until lack of protection is established after several years, the loss in terms of money and effort could be considerable, in addition to the significant delay caused to disease eradication itself and consequent economic loss. Potency and quality testing are thus considered to be necessary to guard against such a situation.

14. Vaccines are made from micro-organisms which have an inherent tendency to vary continually from one generation to another. To consistently produce vaccine of satisfactory quality, strict controls must be used by the manufacturer over all production stages. Although the final quality assessment of a vaccine rests on experience in the field which can be difficult and time consuming, it is generally possible to establish tests in laboratory animals which reliably predict its effectiveness.

15. Special problems are associated with potency testing of brucella vaccines due to the high infectivity of the virulent organism and the duration of testing and exposures. At present, complete laboratory

testing cannot be carried out as a routine procedure because it requires the use of bacteria and the handling of experimental animals which may excrete micro-organisms. As these organisms are contagious, the testing requires special facilities. The proposed laboratory as well as being capable of safely performing such tests, will also investigate testing procedures in an attempt to improve them.

16. There is no laboratory in Australia at the present time which has the facilities or capacity to carry out the testing function required in the eradication campaign. The Committee were told that as the brucellosis eradication campaign slackens off, and the need for vaccine testing lessens, the proposed laboratory will be gradually committed to work with other micro-organisms which requires micro-biological security.

17. The Committee concluded that there is a need for the work in this reference.

THE SITE

18. The proposed laboratory will be located on part of a 50 acre site reserved for the National Biological Standards Laboratory and which is situated in Narrabundah, A.C.T. It is bounded on the north-west by Narrabundah Lane and on the north-east by open land adjoining Jerrabomberra Avenue. Adequate space is available to allow the brucella laboratory to be designed as a building separate from other planned construction, due to its specialised function, and for future building extensions should this become necessary.

19. The Committee agreed that the site selected is suitable.

THE PROPOSED LABORATORY

20. Design Considerations Brucellosis is an infectious disease which aborts unprotected pregnant cattle. A wide variety of other species including man, can also be infected. Its highly infectious nature means that it is an occupational hazard for veterinarians, animal handlers and laboratory workers. It requires sophisticated laboratory handling and control equipment. The main risk to workers is inhalation of aerosols or accidental self-innoculation. The organism may infect by penetrating small skin abrasions, by ingestion, by inhalation or by way of the conjunctiva.

21. The combination of no prophylaxis, high infectivity, difficult diagnosis and a proportion of cases resistant to treatment, clearly demonstrates the need for special precautions to protect employees who regularly handle this micro-organism. Although the susceptibility of the organism to physical agents including drying and sunlight etc. reduces the hazard of spread from a building, the wide range of animal species susceptible to infection indicates a need to make the building vermin and insect proof.

22. Safety Features The primary aim of the design of the laboratory complex will be to protect staff from infection, prevent the dissemination of micro-organisms beyond the building and provide appropriate facilities for accurate and efficient work. Two sources of bacteria are to be controlled, viz. the cultures of micro-organisms and the animals which are inoculated with these and may excrete them. A primary barrier must therefore be established to confine organisms at the work site and also a secondary barrier which in the event of an accidental bacteria release will confine them to the room where it occurs.

23. All effluent, exhaust air, waste products from animals, used gowns etc. will be sterilised as they leave the barrier areas. In addition, the laboratory barrier areas will be under slight negative air pressure and staff will shower when leaving work areas.

24. In the primary barrier areas, laboratory work will be carried out in micro-biological safety cabinets. Air is drawn into the cabinets and exhausted through high efficiency filters to remove bacteria. The cabinet can be used with either gloves fitted or with open ports. When the ports are open, an air flow of 150 ft per minute prevents the escape of bacteria. Materials leaving the cabinets will be packed in plastic bags which are surface sterilised before incineration or completely sterilised in an autoclave.

25. The secondary barrier area will have crack-free floors, walls and ceilings impervious to bacteria, and a slight negative air pressure will prevent egress of bacteria. Back-up equipment will be provided to ensure continuous pressure in the event of mechanical breakdown. Potentially contaminated air will pass through high efficiency filters before discharge, various areas inside the barrier will be capable of isolation and fumigation, and autoclaves and incinerators for sterilisation and disposal of infected wastes will be built directly into the barrier wall. In addition, chlorination plant will treat all potentially infectious waste from sinks and showers, and change and shower rooms will be provided for employees leaving hazardous work areas.

26. Design The buildingswill comprise a gate house and a laboratory surrounded by a security fence. They will be located on the highest point of the site. Access to the enclosed area will be by electrically operated gates and a door controlled from the laboratory building.

27. The laboratory will be a single storey structure comprising two units, the specific pathogen-free (S.P.F.) animal breeding area and the brucella vaccine testing unit, separated by a breeze-way. The animal breeding area will have a barrier section in which the clean service area, the S.P.F. mice and guinea pig areas and the clean change areas will be located. Outside the barrier will be situated the plant room, change room and shower, toilet, dirty service area and bedding store, sawdust store, isolators supplies room and the gnotobiotic animal isolator room.

28. The testing unit will be designed for clean and dirty areas and the main testing area will be surrounded by a barrier. It will contain the laboratory, change rooms, toilets and showers, testing isolator rooms, isolator and re-assembly area, autoclave and service area and the incinerator feeding area. Outside the barrier, offices, a staff lounge, media preparation and wash-up areas, change rooms and toilets, an isolator store and assembly room, bedding, food and cage stores, a cage cleaning area, an incinerator room and a plant room will be situated.

29. Structure The buildings will be founded on concrete strip footings on a sandy clay layer which exists at 4 ft to 6 ft. The gate house will have brick walls, a concrete floor and a metal deck roof. The main building will also have brick walls except for the barrier wall between the testing unit and adjacent areas which will be reinforced concrete. The walls will support a reinforced concrete ceiling slab. The roof will be on steel or timber framing to provide space for fans, filters, ducts, cables and pipes supported on the ceiling slab.

30. Finishes The buildings will be finished in face brickwork. Window frames will be aluminium. The insulated metal deck roof of the laboratory building will be supported on steel portal frames and purlins whilst that of the gate house will be supported on rafters and purlins.

31. Internally, floors will be concrete, and within the barriers will be covered with vinyl sheeting. Other areas will have vinyl or ceramic tiles. Wall finishes generally will be face brickwork and plaster but special areas will have a flexible chemical and water resistant plastic coating. The ceilings will be plastered and finished like the walls.

32. Mechanical Services The air conditioning and ventilation plants proposed will not only perform their normal role but will prevent uncontrolled movement of infected agents in or out of various areas. In the animal breeding house, the clean services area, animal rooms, clean change room, store and the clean air-lock areas will be supplied with germ-free air which will subsequently be discharged through high efficiency filters to prevent contamination. These areas will be maintained at above atmospheric pressure to prevent infiltration of contaminated air. Other areas of the animal breeding house, except the plant room will be air conditioned to normal standards. Small recirculating air systems will ventilate the isolators and cages of the test animals.

33. In the testing unit, the three isolator rooms and the laboratory and their service areas will be supplied with filtered air to reduce the number of airborne particles and prolong the life of the special filters on the animal isolator cages. These areas will be maintained at a pressure below atmospheric to prevent the escape of contaminated air. Exhausted air

will be rendered germ free before discharge. Other areas, except the plant room, will be air conditioned to comfort standards.

34. The air handling units and exhaust fans serving critical areas will be duplicated for standby purposes. The plant will be installed in the roof space of the laboratories to avoid long duct runs and facilitate the maintenance of high standards of reliability and safety.

35. The main plant room of the breeding house will contain the chilled water plant, steam boilers, hot water heating plant, domestic hot water and the central alarm and control station. Standby equipment for chilled water, steam and heating plant will be provided.

36. Other mechanical services will include steam reticulation from the central boiler plant to the heat exchangers, sterilizers and cage washing tanks, as well as liquified petroleum and carbon dioxide gases, a pneumatic sawdust handling system, controls and alarms for critical mechanical systems, an emergency diesel alternator of 100 KVA capacity and sterilizers for decontaminating or transferring materials through barrier walls. Three oil fired incinerators fitted with fly ash arrestors will be provided to incinerate bedding and pathological waste.

37. Electrical Services Electricity will be supplied to a substation on the site and thence reticulated by underground cable. The installation within the barrier areas will be wired in M.I.M.S. cable and light and power in other areas will be provided as necessary. Security lighting will also be installed.

38. Hydraulic Services Water supply and sewerage reticulation will be connected to existing city systems. Brucella bacteria will not be discharged to the drains and to guard against accidental spillages, the sewage will be chlorinated prior to discharge.

39. Fire Protection An automatic fire detection system will be installed throughout the buildings. Fire hydrants and portable fire extinguishers will be installed at appropriate points.

40. Roads and Car Parks Roads and parking areas will be constructed of fine crushed rock with a bituminous concrete surface. Kerbs and gutters will be concrete. Car parking areas for five and 15 cars respectively will be provided outside and inside the security area.

41. Committee's Conclusion The Committee recommend the construction of the work in this reference.

ESTIMATE OF COST

42. The estimated cost of the work when referred to the Committee was $870,000 made up as follows:

	$
Building work	308,000
External engineering services	110,000
Building engineering services	452,000
	870,000

PROGRAMME

43. After an approval to proceed is given, the preparation of final drawings and tender documents is expected to take 12 months. Construction time for the work is estimated at 15 months after a contract has been let.

RECOMMENDATIONS AND CONCLUSIONS

44. The summary of recommendations and conclusions of the Committee is set out below. Alongside each is shown the paragraph in the report to which it refers.

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C.R. Kelly

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Chairman

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23 November 1971.