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Information for action / Information pour action
AUGUST 2004

Brucella suis brucellosis outbreak in Wallis and Futuna

Against the backdrop of dengue fever and leptospirosis outbreaks, a third febrile syndrome with an insidious onset appeared on the island of Wallis in April 2004. Four cases of acute or sub-acute human brucellosis were diagnosed. All the patients were grouped geographically in the north of the island (Hihifo district). Up to now, human brucellosis has been endemic in Wallis and Futuna (one probable case a year) but the bacteria had never been isolated, as diagnosis was mainly clinical and serological. For these four cases, three were confirmed bacteriologically, through identification and typing of the strain involved, i.e. *Brucella suis* biovar 1, thereby making it possible to identify the animal species responsible, i.e. pigs.

I – Epidemiological context

The Territory of the Islands of Wallis and Futuna consists of two small islands located about 250 km apart:
-Wallis, 96 sq. km, 10,071 inhabitants;
-Futuna, 64 sq. km, 4873 inhabitants.

The pig population is distributed in the following manner (1):

	Wallis	Futuna	Total
Breeding farms	1 443	703	2 146
Pigs	**19 731**	**10 369**	**30 100**
Sows	3 757	2 030	5 787
Boars	894	364	1 258
Fattening pigs (> 50 kg)	3 333	1 740	5 073
< 6 months (< 50 kg)	11 747	6 235	17 982

With a ratio of two pigs per inhabitant, and given the isolated nature of these islands, pig density is particularly high.
Moving animals from one farm to another is a common practice for breeding purposes (more than 50% of the farms do not have any boars) or for bartering and this increases the risk that livestock will be exposed to certain illnesses, including brucellosis.
About 30% of the pigs are destined for personal consumption, 60% for custom and only 10% for trade. More than 40% of the pigs that are eaten weigh between 10 and 25 kg. They are usually cooked whole in traditional stone ovens. The “umu” is the Wallisian and Futunan way of braising food. Very often the cooking time is inadequate for thoroughly cooking all the meat.

Beginning in the early 1980s, serological surveys (2,3,4) revealed the existence of brucellosis in pig herds; the prevalence estimated at that time was 25% for Wallis and 17% for Futuna.

II – Clinical cases

Case no. 1:
Male in the 40s, working in fishing

Medical history:
-Longstanding obesity
-Type II diabetes discovered in 2003 treated by oral anti-diabetic drugs
-Recurrent mechanical-type lumbago

History of the illness:
-Patient hospitalised in April for fever and lower back pain
-The patient had experienced fever outbreaks with chills and sweating, mainly in the evenings, self-medicated with paracetamol for the past month; on-going high back pain since two weeks, finally a non-stop series of fevers with sweating and pain since three days
-The back pain was mixed, mechanical and inflammatory.
-A loss of 17 kg over the period of two months was noted.

Clinical exam:
-Cardio-pulmonary auscultation normal
-The abdomen was supple with no pain, no detectable anomalies
-There was no sensory-motor deficit
-There was Lasègue's sign at 40 left and at 60 right with pain on left
-The tendon reflexes were negative on both sides, the plantar reflexes were in flexion

Additional exams:
-The electrocardiogram revealed a simple incomplete right block
-The chest X-ray revealed a projection of the lower right arch of the cardiac shadow, an isolated large right hilum of vascular redistribution, so a cardiac doppler test was scheduled.
-The spinal column X-ray revealed a spina bifida occulta of L5 with discrete retrospondylolisthesis of L5 on S1 on known lumbrosacral hyperlordosis; a discrete anterior wedge fracture of D12 with osteophytic reaction in front of disk D11D12, which itself had a vague flaky appearance
-Biology: see III

Course of the illness:
-A diagnosis of infectious spondylitis was made while awaiting the results; the treatment prescribed was Augmentin (amoxillin/clavulanate) 4 g a day in conjunction with Oflocet (oflaxacin) 600 mg a day
-The patient left the hospital against medical advice after two days of hospitalisation while awaiting the results of the lab exams
-He was called back two days later when his blood test proved positive for brucellosis so as to begin treatment with doxycycline 200 mg once a day and rifampicin 1200 mg once a day with bed rest and clinical and lab control exams scheduled for Days 8, 20, 30 and 45, with CRP, liver enzymes and creatinine.
-Treatment was halted after six weeks with clinical normalisation, only the mechanical lower back pains persisted; there were no more fever peaks or hyperhidrosis after Day 20 of the treatment, a control X-ray of D12 was scheduled at three months.

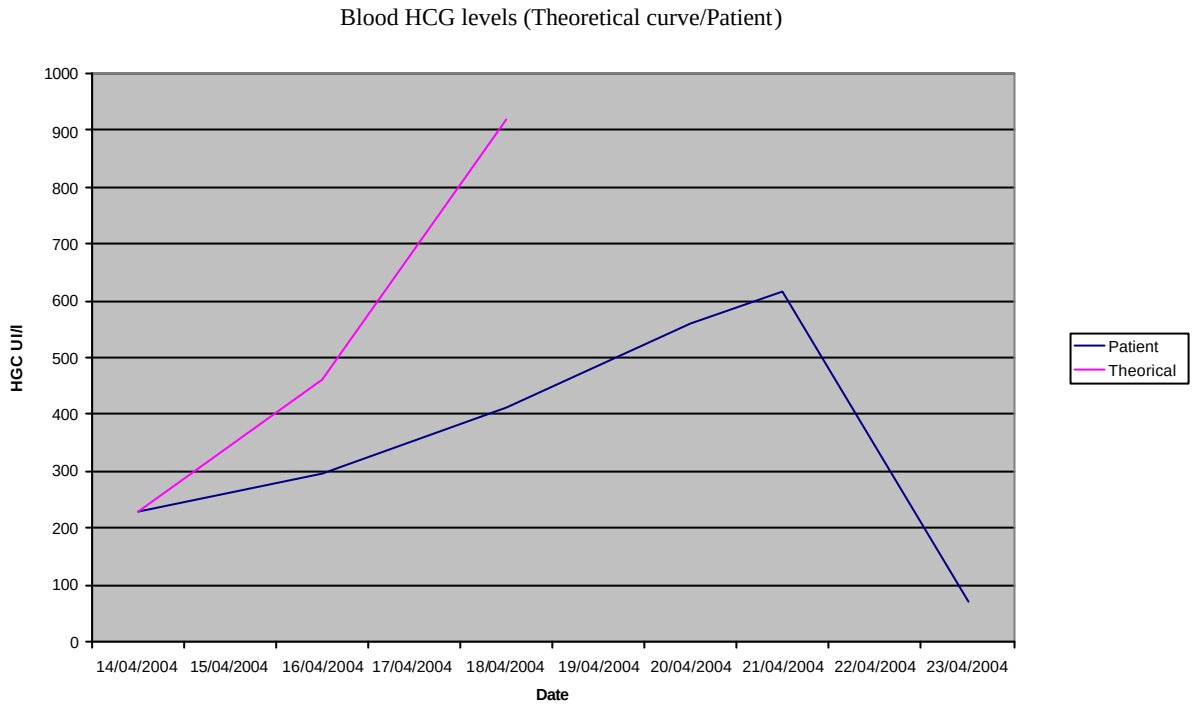
Case no. 2:
Female in the 20s

History of the illness
-The patient came to the Gynaecology and Obstetrics Department in April 2004 due to metrorrhagia and abdominal pain.
-Her last period were 6 weeks ago.
-A HCG assay taken the day before was positive at 230 IU/L.

Clinical exam
The clinical exam showed:
-diffuse sensitivity of the abdomen,
-A healthy-looking cervix with metrorrhagia of endo-uterine origin.
-A normal feel of the vagina,
-The pelvic and endovaginal ultrasound revealed a slight Douglas effusion with an empty uterus and 16 mm endometrium.

Course of the illness
-The patient was hospitalised for a possible ectopic pregnancy or threatened miscarriage.
-In the afternoon of the day she was hospitalised, her temperature peaked at 39.8°C, with a clinical exam with no specific symptoms and a fever that was very well supported in spite of hyperhidrosis. A complete set of tests was carried out (FBC and platelets, CRP, vaginal sample, urine culture, haemoculture). This revealed a leucopenia at 3800 leucocytes/mm3 with 40% lymphocytes including 4% hyperbasophilic lymphocytes, a CRP at 40 mg/l. The patient was given Perfalgan® (paracetamol) 1 g as needed and monitored.
-The temperature peaked a second time at 39.3°C the following morning without any specific symptoms other than a slight sensitivity of the lumbar fossa. A second series of haemocultures was conducted and the patient was given Augmentin® (amoxillin/clavulanate) 1 g three times a day.
-Forty-eight hours after admission into the hospital, the clinical exam did not reveal anything in particular, other than a slight sensitivity during uterine manipulation.
-The 4th day after admission, the HCG level was 413 IU/L. The endovaginal ultrasound showed a thicker endometrium and a hypoechogenic image 4 mm in diameter that could have been either an ectopic pregnancy pseudo-sac or an endo-uterine sac. The changes in the HCG blood level tended towards an ectopic pregnancy or a threatened miscarriage as the level did not double every 48 hours as shown by the theoretical curve usually seen in normally developing pregnancies (see graph).
-Given the persistence of the temperature spikes despite antibiotics (39.2°C the 5^{th} day), a new series of blood tests were done on the 6^{th} day. The CRP was 59 mg/l with increased leucopenia at 2800 leucocytes/mm3 and the appearance of thrombocytopenia with 112,000 platelets/mm^3 and the HCG reading was 558 IU/l.
-The tests made on the 7^{th} day revealed persistent leuco-thrombocytopenia with 3500 leucocytes/mm^3 and 114,000 platelets/mm3 and a HCG reading of 615 IU/l. Given the FBC results, the diagnoses of dengue fever or leptospirosis were considered and blood tests ordered. They came back negative.
-The new series of blood tests carried out eight days after the beginning of hospitalisation, showed that the leuco-thrombocytopenia had disappeared, the CRP was at 20 mg/l and the HCG was 69 IU/l, combined with the disappearance of fever spikes. So the diagnosis of miscarriage was confirmed in the context of febrile syndrome of unknown origin (negative vaginal sample and urine culture and negative hemocultures at D5). The patient left the hospital with a prescription of Augmentin® (amoxillin/clavulanate) for seven days.
-On the 7^{th} day after the sampling, the haemocultures finally revealed the existence of Gram negative bacteria initially identified as *Moraxella phenylpyruvica*. Given this result and the

existence in the Territory of Wallis of a case of human brucellosis (Clinical case no. 1) in a person from the same village, a brucellosis serology was ordered and came back positive. The haemocultures were reanalysed and this made it possible to formally identify the existence of *Brucella suis* biovar 1. So the patient was given rifampicin and doxycycline for six weeks. Her CRP control test at the end of treatment was negative.



Discussion

We had to care for a patient who had a double pathology (miscarriage and acute brucellosis) in a context where only a single case of human brucellosis had been uncovered in the Territory of Wallis and Futuna one week beforehand. According to Janbon (5), miscarriage is rarely described except perhaps in certain countries like Peru where this phenomenon seems to be more common. However, this diagnosis is probably rarely considered and so rarely verified. Our observations tend to make us think that the acute brucellosis was the cause of our patient's miscarriage and that the diagnosis of brucellosis would never had been confirmed if all the bacteriological samples ordered systematically had not been carried out. In order to diagnose this fever in early pregnancy, we not only had to systematically carry out all the normal bacteriological samples but also had to hold discussions between the clinicians and biologists while keeping in mind the epidemiological context we were working in.

Case no. 3:
Female in the 20s

Medical history:
-No previous surgery
-Family history of diabetes and high blood pressure
-Amenorrhoea for more than six months with negative ßHCG

History of the illness:
-Hospitalised in April for a pseudo-flu syndrome with febrile crises, muscle soreness and vomiting for the past week
-The interview uncovered fever spikes of more than 40 °C with chills and sweating, each lasting one to two days, "self-medicated" with paracetamol since 2 weeks, with a constant ongoing fever of about 38 °C
-Pain in the iliac fossa and the right flank accompanied the fever spikes
-No change in patient's overall state was noted but she has been subject to very intense fatigue and loss of appetite for two weeks.

Clinical exam:
-Normal cardio-pulmonary auscultation
-The abdomen was supple, sensitive overall, especially on the right from the iliac fossa to the lumbar fossa
-There were no neurological or articular symptoms
-The genital and urinary exam was normal.

Additional exams:
-The electrocardiogram showed a resting tachycardia of 120/minute
-The chest X-ray was normal
-The cardiac doppler was also normal
-The abdominal-pelvic ultrasound did not reveal any anomalies
-Biology: a neutro-thrombocytopenia syndrome, combined with moderate hepatic cytolysis, a minor inflammatory syndrome and a fairly low CRP (35 mg/l) were revealed by the initial series of tests but were not much help, as they could orient diagnosis toward a dengue-like syndrome or a gram-negative bacteraemia.

Course of the illness:
-A diagnosis of an upper urinary tract infection was made temporarily while waiting for the bacteriological results and the treatment prescribed was Augmentin (amoxillin/clavulanate) 3 g a day combined with Oflocet (oflaxacin) 600 mg a day
-The urine culture results did not confirm this diagnosis and the patient's fever shot up to 40°C on the fourth day in the hospital. The haemocultures were then redone during a episode of strong chills with intense cold sweating. Blood was also taken to be tested for dengue fever, leptospirosis and brucellosis.
-The fever then subsided over a period of four days
-The brucellosis serological test came back positive on the day the patient left the hospital. She had not had a fever for four days, was regaining her appetite and did not have any more symptoms. This blood test was then confirmed by a haemoculture that was positive for *Brucella suis* biovar 1.
-The antibiotic treatment underway was halted and replaced by doxycycline 200 mg once a day and rifampicin 900 mg once a day with clinical and laboratory control tests scheduled for Days 8, 20, 30 and 45 with CRP, hepatic enzymes and creatinine, monitored by the district medical clinic whose doctor confirmed clinical and laboratory recovery.

Case no. 4:
Female in the 40s

Medical history:
- No previous surgery
- Type II diabetes controlled with oral anti-diabetic drugs

History of the illness:
- Patient mentioned that she had had an intermittent isolated fever with sweating and pain for more than two weeks
- The interview revealed close relations with a patient recently infected with brucellosis in the geographic perimeters of the other three recent cases
- A moderate change in the patient's overall state could be noted and she had been suffering from unusual fatigue and lack of appetite over the preceding two weeks.

Clinical exam:
- Normal cardio-pulmonary auscultation
- The abdomen was supple and not painful
- There were no neurological or articular symptoms
- The genital and urinary exam was normal but the patient complained of a frequent need to urinate that appeared recently

Additional exams:
- The electrocardiogram was normal
- The chest X-ray was normal
- The abdominal and pelvic ultrasound did not show any anomalies
- Biology: see III; in the context, besides the normal laboratory and bacteriological tests, a brucellosis blood test was ordered immediately.

Course of illness:
- A diagnosis of brucellosis was made rapidly and treatment began with doxycycline 200 mg once a day and rifampicin 900 mg once a day.
- The fever then subsided over the period of a week
- Clinical and laboratory controls were scheduled for Days 20, 30 and 45 with CRP, hepatic enzymes and creatinine monitored by the district medical clinic, whose doctor confirmed clinical and laboratory recovery.

Clinical reminders about brucellosis or Malta fever or melitococcosis

Symptoms of the primary infection septicaemic form:
- Undulant fever with sweating and pain
- With or without splenomegaly and poly-adenopathy
- Miscarriage of a normal pregnancy
- Premature birth

Focal form symptoms:
-Nerve: meningitis, encephalitis
-Osteoarticular: arthralgia or osteoarthritis similar to Pott disease
-Glandular: orchitis
-Respiratory: bronchitis, pleurisy, pseudo-tuberculosis pulmonary form
-Cardiovascular: infective endocarditis
-Hepatic: hepatitis

Symptoms of chronic non-localised form
-this is chronic brucella fatigue: strong asthenia, polyalgia, sweating

Cause:
-Brucellosis ingested with raw milk or from fresh cheese
-Contact with infected meat or placentas
-Contact with carrier animals:
sheep, goats, pigs, camels, buffalo, wild ruminants
marine mammals

Treatment
-Prevention
cattle vaccination?
Slaughter animals whose blood tests are positive
Pasteurise milk
Personal prevention for professional at risk (masks, gloves)
Vaccinate exposed subjects but the vaccine may no longer be available.

-Treatment:
This is vital to avoid the development of chronic forms and relapses
Tetracycline: doxycycline 200 mg in the evening for 6 weeks
Combined with rifampicin, 900 to 1200 mg in the morning for 6 weeks
For pregnant women, only use rifampicin

III – Laboratory diagnosis of brucellosis at the Wallis and Futuna Health Agency's laboratory

a) Bacteriological diagnosis

Brucella is a Biological Class 3 germ and a potential bioterrorism agent. For those reasons, samples must be treated under a biological hazard hood and it is advisable to wear glasses, masks, smocks and gloves (6).

The haemocultures were done in liquid medium bottles only (Hemoc Signal, Oxoïd®). After 24 hours at 36°C in agitation, the bottles were placed in a conventional incubator at 37°C and observed twice a day with resuspension of the erythrocytes.

For the first two cases, the haemocultures became positive after seven days of incubation. For the third case, direct examination of the broth was done after three days of incubation and revealed the existence of Gram negative coccobacilli (the haemocultures did not display any visual signs of a positive reaction). As for the Case no. 4, the haemocultures were still sterile after 21 days of incubation.

The direct examination after Gram coloration showed:
-Case no. 2: fine Gram negative bacilli, which is not conventional
-Cases no. 1 and 3: Gram negative coccobacilli

Subcultures were reseeded on:
-PolyVitex chocolate agar incubated at 37°C with a 5 to 10% CO_2 - enriched atmosphere
-Drigalski agar incubated aerobically at 37°C.

After 48 hours of incubation, small grey to white colonies appeared on the PolyVitex chocolate agar, whereas the Drigalski agar remained sterile.

The tests for cytochrome oxydase and catalase proved positive.

Biochemical identification galleries for non-enterobacteria Gram negative bacilli (API 20NE, BioMérieux®) gave false orientation towards *Moraxella phenylpyruvica*: NO_3 + and Urea + were the only positive tests (7).

Detecting ureasic activity in urea-indole medium (urea-tryptophan) was very rapid: <30 minutes.

At that stage, the presumption of brucella was strong but as the laboratory could not go any further in its attempts at diagnosis, two of the three strains were sent to mainland France to the National Brucella Reference Centre at the French Food Health Safety Agency (AFSSA) for identification and typing.

The complete identification was: *Brucella suis* biovar 1, variant strains with regards to the type strain (growth on basic fuchsine).

	Clinic		Hemocultures		
	Symptoms began (day)	**Symptoms**	**Sample date (day)**	**Date of positive result (day)**	Identification
Case no. 1	0	Spondylitis	31	38	*Brucella suis* biovar 1
Case no. 2	24	Febrile miscarriage	24	31	*Brucella suis* biovar 1
Case no. 3	36	Febrile syndrome	36	39	*Brucella suis* biovar 1
Case no. 4	39	Febrile syndrome	53	0	0

b) Serological diagnosis

The French Laboratory Procedural Code requires that for serological diagnosis of brucellosis, at least two techniques be used to uncover inhibiting antibodies:
-the Rose Bengal buffered plate antigen test (RBP)
-Wright's serum tube agglutination test (SAT)

The following results were obtained:

	Clinical symptoms began (day)	**Sample date (day)**	**RBP**	**SAT**
Case no 1	0	32	+	480 IU/ml
Case no 2	24	45	+	7680 IU/ml
Case no 3	36	42	+	1920 IU/ml
Case no 4	39	50	+	3840 IU/ml

c) Other laboratory data

-Haematology
Leuco-thrombocytopenia was only observed in Case no. 2 (1200 leucocytes/mm^3 and 112,000 platelets/mm^3). Case no. 3 had a minor thrombocytopenia (149,000/mm^3). For the three acute forms with sweating and pain (Cases no. 2, 3 and 4), the complete blood count was reversed.

-Biochemistry
In the three acute forms, there was hepatic cytolysis (ASAT and ALAT 3 to 7 times the normal level) and the C-reactive protein (CRP) was moderately high (between 40 and 60 mg/l). In the sub-acute form (Case no. 1), the aminotransferases were below normal and the CRP was between 100 and 140 mg/l.

Reminders about laboratory diagnosis of the *Brucella* genus

Bacteriological diagnosis (8):

All clinicians must indicate any suspicion they have of brucellosis.

Brucella is a Biological Class 3 germ and a potential bioterrorism agent. For those reasons, samples must be treated under a biological hazard hood and it is advisable to wear glasses, masks, smocks and gloves (6).

Samples:
-Forms with sweating and pain: haemoculture since the bacteraemia is continuous; it is advisable to conduct three haemocultures on the 1st day and then three on the 2nd day
-focal forms: CSF, pus, articular liquid, lymphatic tissue, etc.

Culture media: enriched media incubated at 37°C with 5 to 10% CO_2

Principle bacteriological characteristics:
>Diagnosis of genus
-morphology: non-capsulated, immobile and non-sporulating gram negative coccobacilli
-culture characteristics: grows poorly and slowly in hemoculture (2 to 4 days in blood analyser, 7 to 21 days using the non analyser method) and on chocolate agar (>2 days).
- obligate aerobe, does not ferment sugars
-oxydase + catalase + very rapid urease, nitrate reductase +
-use of a biochemical identification gallery (API 20NE gallery, BioMérieux©) can falsely point to *Moraxella phenylpyruvica*

>Diagnosis of species and biovar: can only be done in a very specialised laboratory.

Molecular biology
Techniques exist but they have not yet proven their usefulness in practice

Indirect diagnosis (9)

Wright agglutination test (SAW)

Particularly well adapted for screening all acute forms of brucellosis since it detects the IgMs more specifically. It will give positive results from the 10th to 12th day of the illness and rapidly becomes negative (the antibody counts decreases in 4 to 8 months). It is vital to look for inhibiting antibodies in the event of a negative reaction.
A titre equal to or higher than 1/80, i.e. 120 IU/l is significant. Low titres justify control samples two to three weeks later.
Brucella's antigen relationships with *Francisella tularensis, Yersinia enterocolitica* serotype O9 and *Vibrio cholerae* are the source of false positive reactions.

-Rose Bengal buffered plate antigen test (RBP)
This makes it possible to detect almost any case of brucellosis. Sensitive and specific, it mainly detects IgMs and gives positive results only slighter later than the serum agglutination test. It is recommended for both diagnosis and epidemiological surveys.
In contrast to the SAT, this is not a quantitative reaction and in the event of positive results, the antibody reading must be done by SAT.

-Complement fixation test
Detects IgG and gives positive results later than the SAT but lasts longer. It is therefore used to diagnose focal and late forms.

-Indirect immunofluorescence and ELISA tests
These are undeniably the most sensitive and specific tests. They make it possible to detect and measure IgG and IgM levels. They are useful at all stages of the disease.

Brucellin skin reaction test (HSR)
Reveals delayed hypersensitivity to brucellla antigen. It gives positive results four weeks after clinical symptoms have begun and is mainly useful for diagnosing chronic brucellosis.

Summary table showing the use of the various brucellosis laboratory diagnosis methods depending on the stage of the illness

Stage of illness	Bacteriological diagnosis			Indirect diagnosis		
	Haemoculture	Bone marrow culture	Other	RBP and/or SAT	IFI or ELISA	HSR
Acute	++	+++	-	+++	+++	-
Focal subacute	+	++	+++	+	+++	+
Chronic	-	-	-	-	+	+++
Systematic screening	-	-	-	+++	ELISA	+++

(according to N. Boujaafar, G. Zambardi, W. Hansen, M. Ramuz, J. Freney in *Manuel de Bactériologie Clinique*, vol 3, 2nd edition)

IV – Public health measures

a) Origin of the contamination

Patient interviews did not allow us to determine the precise origin of the contamination due to the difficulty in collecting information.

However, the variant nature of the strains identified (grown on basic fuchsine) pointed to a common source of contamination. In addition, the four cases belonged to four groups with family ties, each of the four groups owned a farm, three of which had at least one pig with positive blood tests. On a rotating basis, the four patients took care of a fifth farm with four pigs, two of which had positive blood tests. This farm was also considered to be a potential source of contamination on the same footing as the other three farms.

b) Screening patient contacts

Systematic screening was conducted on the people who lived in the same households as the index cases (10): respectively 8 people for case 1, 11 for case 2, 5 for case 3 and 5 for case 4.

The following protocol was applied:
-absence of suspicious clinical symptoms: RBP; if the screening was positive to SAT
-clinical symptoms: RBP + SAT

The survey was held in June and July 2004.

This survey allowed us to uncover one new case, i.e. in the husband of Case no. 2. He had been hospitalised in late October 2003 for a febrile syndrome with leuco-thrombocytopenia, hepatic cytolosis and a CRP of 60 mg/l. The dengue fever and leptospirosis serologies were negative. Two haemocultures were taken: one was contaminated by coagulase-negative staphylococci, the other remained sterile.

A brucellosis serology was conducted on a serum bank sample dated 05/11/2003 and the results were positive (RBP + SAT 3840 IU/ml).

c) Screening at-risk subjects

The following were classified as at-risk subjects:
-hospital laboratory staff (n=5)
-Animal Health Service staff
-owners of and workers on farms with at least one pig that had positive screening tests in June 2004 (cf. 5b).

To date, only the laboratory and Animal Health Service staff have been screened; all the results were negative.

d) Information and education

Health professionals were made aware of this diagnosis, which must be considered when dealing with a flu or fever syndrome with a insidious start.
A public information campaign was conducted about the disease and protection measures (distribution of leaflets, television, radio).
A health education campaign for farmers has begun.

e) Seroprevalence survey of the general population

A seroprevalence survey of the overall population combined with an animal health survey is to be set up over the coming weeks.
The goals of this survey are to:
-estimate and describe brucellosis prevalence in the population
-compare the prevalence in people exposed to positive farms as compared to people who are not exposed
-determine risk factors depending on the type of activity, age, etc.

V – Animal health measures

a) Administrative measures

Measures prohibiting the export of pigs to Futuna, New Caledonia and foreign countries were implemented as soon as the human cases were reported. New Caledonia health authorities were informed immediately.
An order was issued by the Prefect prohibiting transport and movement of pigs on the island but it is difficult to enforce, given local habits.

b) Screening campaign

In order to detect brucellosis in pigs, 35 farms were selected according using the following criteria:

-Group "A": 4 farms with human cases (farmers) of brucellosis including one with animals suffering from reproductive difficulties
-Group "B": 3 farms whose farmers had ties with the farmers infected with the human form and whose animals have reproductive difficulties (at the time, the possibility of brucellosis was raised for one of the three farmers but the tests were negative).
-Group "C": 13 farms, including one commercial farm (CF), with animals with reproduction difficulties (miscarriages, stillbirths);
-Group "D": 15 "control group" farms.

An initial series of blood samples was taken on a total of 101 pigs at these 35 farms from 5 to 7 June 2004. Twelve pigs from nine different farms tested positive. Blood sampling of the pigs at these 35 farms continued until 6 August 2004. Blood samples were taken from some 565 out of the 567 animals aged six months and over. The two animals that were not tested were from contaminated farms. They were shy animals: one was a sow in the final stages of gestation and the other was a fattening pig that ran away. The samples and results were as follows:

Brucellosis according to the four selection criteria

	Number of farms sampled	Number of contaminated farms	Rates	Number of animals sampled	Number of animals sampled at contaminated farms	Number of contaminated animals	Rates
A	4	3(1)	75.0 %	11	10	4	40.0 %
B	3	3	100.0 %	14	14	3	21.4 %
C	13	3	15.4 %	218	20	5	18.8 %
CF				113	113	20	17.7 %
D	15	5	33.3 %	209	67	8	11.8 %
Total sampled	35	14	40.0%	565	224	40	17.9 %

(1) At the time of the survery, the non-contaminated farm had just one sow purchased a few days beforehand. t.

Three Group A farms were contaminated with brucellosis. The fourth only had one sow that they had just bought. All the Group B farms (3 farms) were contaminated.

Status and results of the blood samples from 35 pig farms by district

	Hihifo	Hahake	Mua	TOTAL Wallis
FARMS				
Farms involved in sampling	15	10	10	35
Farms where all the pigs were sampled and which proved not to be contaminated	8	6	7	21
Farms with at least one pig with a positive blood test	7	4	3	14
ANIMALS				
All the farms				
Pig samples analysed	142	254	169	565
Pig samples analysed at contaminated farms	33	159	32	224
Pigs with positive blood tests	8	26	6	40

For the 35 farms
-21 farms (60%) where all the pigs were sampled had no pigs that tested positive;
-14 farms (40%) had at least one pig with a positive blood test;
-40 pigs had positive blood tests out of the 565 whose blood tests were analysed.

These farms are not representative of all the farms on Wallis.

b) Pig stock control and clean-up measures

Those animals which tested positive are isolated before slaughter. Pigs are slaughtered with their owners' permission, before being put into a pit. The farming facilities are then disinfected.

Various direct and indirect compensation measures were studied. A brucellosis prevalence survey should make it possible to assess the number of farms involved as well as the number of pigs infected and to evaluate the costs of the various public health and prevention measures deemed necessary to try to eradicate this zoonosis. It should also make it possible to plan funding for the compensation to be proposed to the farmers involved.

VI – Conclusion

Brucellosis persists in a certain number of countries in the world, in particular developing countries (5). It is vital to always conduct all the bacteriological tests in order not to overlook certain diagnoses that have become rare and even exceptional for some of us and to be able to treat the patient holistically and implement appropriate health measures. Brucellosis is a mandatory notifiable disease that affected four people in the Territory of Wallis in April 2004. This requires that not only the people be cared for but also a survey be done on potentially contaminated and contaminating farms that must, then, be treated.

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Bibliographic references:

1. Nuttens, F. 2003. Recensement agricole 2001 du territoire, Service territorial des affaires rurales et de la pêche. Ministère de l'agriculture, de l'alimentation, de la pêche et des affaires rurales. République française.
2. Bertin, J. 1985.
3. Rabany, B. 1986.
4. Martin, T. 2000. La santé animale à Wallis et Futuna. Nouméa: Secrétariat général de la Communauté du Pacifique.
5. Janbon, F. 2000. Brucellose. EMC, Maladies Infectieuses, 8-038-A-10, 11p.
6. Grammont-Cupillard, M., Berthet-Badetti, L., Dellamonica P. 1996. Brucellosis from sniffing bacteriological cultures. Lancet Dec:21-28.
7. Batchelor, B.I. et al. 1992. Biochemical mis-identification of *Brucella melitensis* and subsequent laboratory acquire infections. J. Hosp. Infect. 22:159-162.
8. Philippon, A. cours de bactériologie médicale, genre Brucella, http://www.microbes-edu.org/professionel/brucel.html. Found on internet on 15 may 2004.
9. Pasteur Cerba Laboratoire 2003. Guide des analyses spécialisées, Pasteur Cerba Laboratoire, 4ème édition.
10. Almuneef, M.A. et al. 2004. Importance of screening household members of acute brucellosis cases in endemic area. Epidemiol. Infect. 132:533-540.