Husbandry and Care of Giant Panda at Kobe Oji Zoo

○Shosuke Taniguchi, Kenichi Yoshida, Ryoji Umemoto, Kumiko Hanaki
（Kobe Oji Zoo）

Kobe Oji Zoo introduced a pair of giant pandas from the China Wildlife Conservation Association in 2000 and engaged in a cooperative breeding research program between China and Japan. Natural breeding and artificial insemination programs began in 2003, but in 2007 there was a stillbirth, and although 2008 had a successful delivery, the cub did not grow up. Following the death of the male in 2010, the female has been kept independently, and she became 23 years old this year. Behavioral observation and urinary hormone testing of the female continued as a form of basic breeding research, and from 2009, large fluctuations in the seasonality of estrus and pseudo-pregnancy periods were observed, and the influence of birth, absence of male, and age were suspected. Furthermore, in order to fulfill daily health care, treat illness and deal with many issues related to aging, husbandry training has been enhanced in recent years. In April 2017, corneal opacity and ulcer in the left eye was exhibited. Fungal keratitis was suspected, and using husbandry training, antifungal eye drops, eyelid disinfection, and other medical treatments were applied diligently, and three months later, the receding of symptoms was confirmed. Intraoral care, ultrasound examination, and blood pressure measurement programs have also commenced. In the future, we will endeavor to continue our basic breeding research and ensure health care for the individual.

Husbandry and Care of the Giant Panda at Kobe Oji Zoo

在神户市立王子动物园进行的大熊猫的饲养和护理

2018.11.7-11

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Kobe Oji Zoo

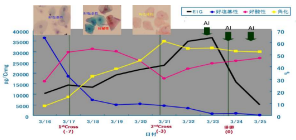
Panda breeding research at Kobe Oji Zoo

在神户市立王子动物园实施的繁殖研究

Year	Event
2000	First pandas, Koko ♂ and Tantan ♀ arrive at the zoo 第一代兴兴♂・旦旦♀来园
2002	Second generation Koko ♂ arrives at the zoo 第二代兴兴♂来园
2003	Started natural breeding 自然交配开始 Started artificial insemination 人工受精开始
2007	Stillborn panda 死产
2008	Panda born 生产
2010	Koko ♂ dies 兴兴♂死亡

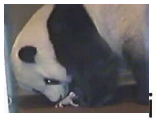
Research examples: Predicting ovulation date using vaginal smears

研究事例：根据阴道细胞预测排卵日期



Artificial insemination
人工受精

Birth
生产



Current individual at the zoo

现在的饲养个体

Sex 性别	Female 雌
House name 爱称	Tantan 旦旦
Date of birth 出生日	16 September 1995 (23 years old) 1995年9月16日（23岁）
Place of birth 出生地	Bifengxia Giant Panda Base 卧龙大熊猫繁殖中心
Date of arrival at the zoo 来园日	16 July 2000 2000年7月16日

Age of giant pandas 关于大熊猫的年龄：

Enter old age from 20 years and veterinary management is required from 25 years onwards

20岁以上为高龄、25岁以上需要进行兽医学上的管理

Source: "Giant Pandas; Biology, Veterinary Medicine and Management" Cambridge University Press

Aim and content of the research

调查目的和内容

Aim 目的

The aim of this study was to investigate new methods of managing the health of an individual who has started to age, while continuing basic research on breeding.

在继续有关繁殖的基础研究的同时，研讨开始高龄化的个体的健康管理的新手法。

Research content 调查内容

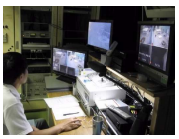
① Continue behavioral observations and sex hormone tests, analyzing seasonal changes.
继续进行活动观察和性激素检查，分析其季节性的变化等。

② Enhance husbandry training for health management and apply the training to the treatment of disease.
为做好健康管理强化受诊动作训练，并应用于疾患的治疗。

① Breeding research 繁殖研究

Methods

方法



Behavior monitoring 活动观察

We check 24-hour video monitors, and record daily eating and moving times in minute increments

确认24小时录像的监视器、以分钟为单位记录食物摄取时间和运动时间

Urinary hormone tests 尿液中性激素的监测

Tantan's urine is collected daily, and E1G and PdG in the urine during the breeding season are measured with EIA tests

保存每天的尿液，用EIA法测量繁殖期中的尿液中的E1G以及PdG

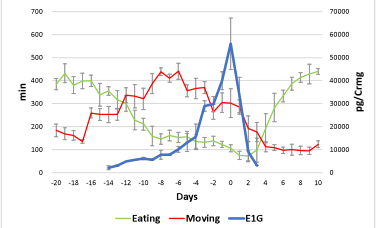
① Breeding research 繁殖研究

Eating/moving times and changes in sex hormones

食物摄取・活动时间和性激素动态

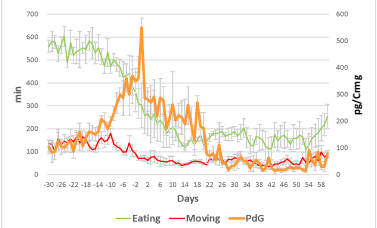
Eating/moving times and E1G (2001-2006 Average)

食物摄取・活动时间和E1G（2001-2006平均）



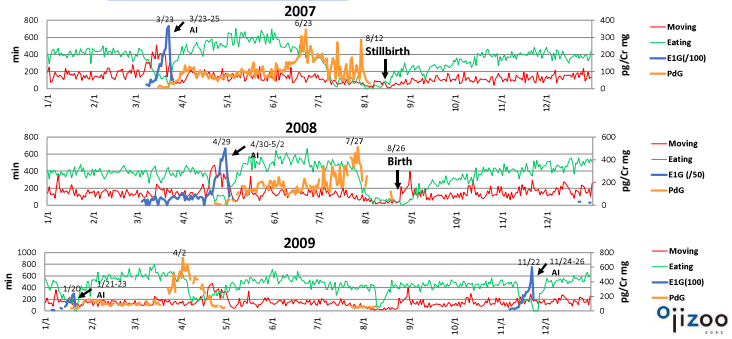
Eating/moving times and PdG (2001-2006 Average)

食物摄取・活动时间和PdG（2001-2006平均）



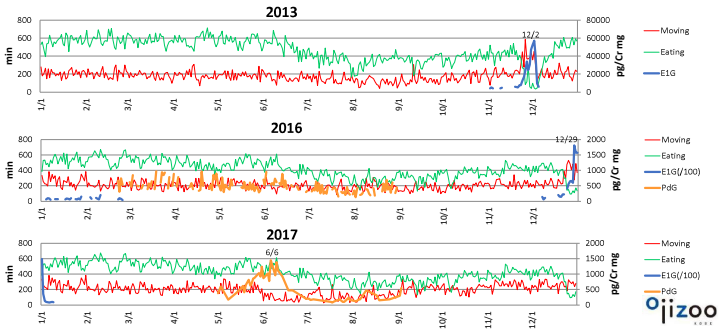
① Breeding research 繁殖研究

Eating/moving times and changes in sex hormones
食物摄取・活动时间和性激素动态



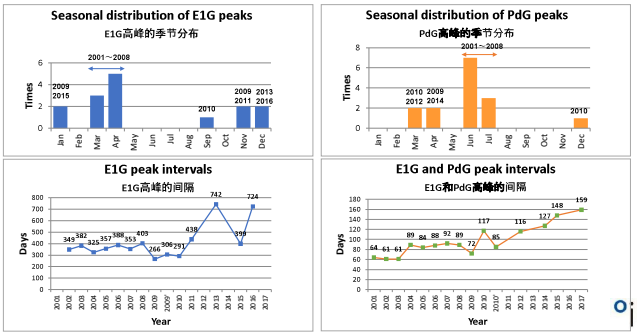
① Breeding research 繁殖研究

Eating/moving times and changes in sex hormones
食物摄取・活动时间和性激素动态



① Breeding research 繁殖研究

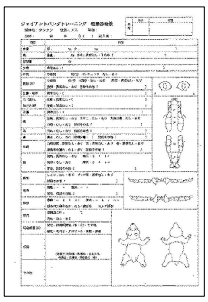
Changes in the movement of sex hormones
性激素的动态的变化



② Health management with husbandry training 通过受诊动作训练的健康管理

Husbandry training methods
受诊动作训练的方法

Health record



② Health management with husbandry training 通过受诊动作训练的健康管理

Husbandry training methods 受诊动作训练的方法

Target training 对象训练

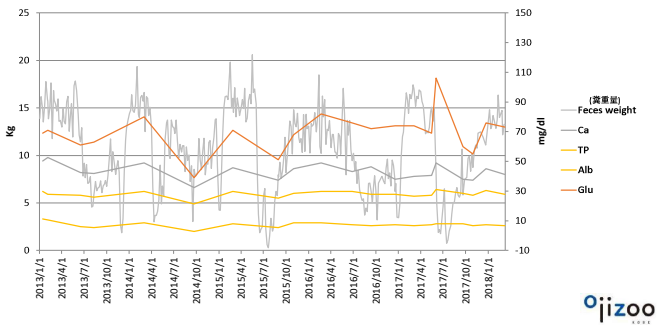
Abdominal palpation, body temperature measurement, and vaginal smear 腹部触诊、测量体温、阴道涂片

Auscultation 听诊

Blood collection 采血

② Health management with husbandry training 通过受诊动作训练的健康管理

Seasonal changes in blood characteristics
血液特性的季节变化



Treatment of eye disease
眼疾的治疗

2017.4.8
Corneal clouding 角膜白浊

2017.4.20
Corneal ulcer 角膜溃疡
Raised cloudy area 白浊部隆起
Swollen eyelids 眼睑肿胀

2017.5.13
Severe cloudiness 白浊恶化
Angiogenesis in lower part 下部血管新生

2017.5.26
Conjunctival hyperemia 结膜充血
Hordeolum (sty) 麦粒肿

⇒ Diagnosed with mycotic keratitis (suspected) by a veterinarian
经兽医眼科专家诊断为真菌性角膜炎

⇒ Eye drop treatment and eyelid disinfection were started with husbandry training
通过受诊动作训练, 开始点眼治疗和眼睑消毒

Eyedrops
点眼

Eye drop equipment:
A syringe with a small animal feed needle (plastic) attached
点眼器具：在注射器上装上小动物用的经口探针（塑料制）

Eyelid disinfection
眼睑消毒

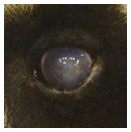
Treatment of eye disease 眼疾的治疗

Date 年月日	Symptom 症状	Treatment (eyedrops) 治疗（点眼）	Frequency 次数	Treatment (other) 治疗（其他）
2017/4/8	Central cloudiness, raised area 中央部白浊・隆起	LVFX 左氧氟沙星 Hyaluronic acid 玻尿酸	3 3	
2017/4/20	Swollen upper and lower eyelids 上下眼睑肿胀	LVFX Hyaluronic acid Pranoprofen 普拉洛芬	3 3 3	
2017/5/19	Worsened cloudiness, conjunctival hyperemia 白浊部恶化、结膜充血 Angiogenesis (lower part) 血管新生（下部）			ERFX intramuscular injection 恩诺沙星肌肉注射
2017/5/25	Mycotic keratitis (suspected) 真菌性角膜炎	LVFX	3	Oral itraconazole 伊曲康唑内服
2017/6/1	Reduced cloudiness 白浊好转 Angiogenesis (upper part) 血管新生（上部）	Povidone-iodine 碘伏 LVFX Fluconazole 氟康唑 Hyaluronic acid Squalane 玻尿酸角鲨烷	1 1 2 1	Oral itraconazole
2017/7/17	Improved corneal transparency 角膜透明度改善 Residual cloudiness 白浊残留 Blood vessels disappeared 血管消失	Povidone-iodine LVFX Fluconazole Hyaluronic acid Squalane	2 1 2 1	
2017/8/12	No change 无变化	LVFX Fluconazole Hyaluronic acid Squalane	2 2 1	
2017/8/29	No change 无变化	LVFX Fluconazole	2 2	Eyelid cleaned with chlorhexidine 使用氯己定清洁擦拭眼睑

Treatment of eye disease
眼疾的治疗

2017.5.29
Angiogenesis in upper part 上部血管新生

2017.6.2
Reduced conjunctival hyperemia 结膜充血减轻

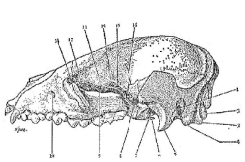


2017.6.13
Reduced cloudiness 白浊减轻
Blood vessels disappeared 血管消失

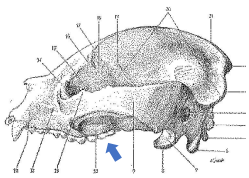
2017.7.21
Transparent cornea 角膜透明化
Residual cloudiness 白浊残留

⇒ Although there is residual cloudiness, there is improved corneal transparency and recovery of vision
虽然白浊部还有残留、但角膜的透明度提高、视力恢复。

Wearing of molars with increased age
伴随高龄化的臼齿磨损



Young giant panda
青年

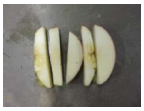


Elderly giant panda
老年

Source: Large animal anatomy – Systematic anatomy and organ histology; Beijing Zoo
引用：「大熊猫解剖－系统解剖和器官组织学－」北京动物园等著

② Health management with husbandry training 通过受诊动作训练的健康管理

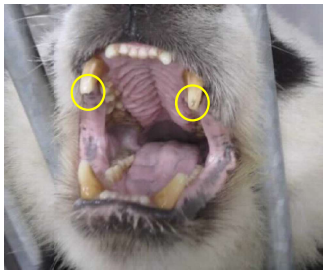
Oral examination
口腔内检查

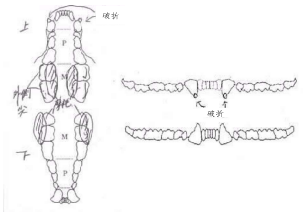


Reinforcer:
Thinly sliced apple
增强材料：
切成细长条的苹果

② Health management with husbandry training 通过受诊动作训练的健康管理

Oral examination
口腔内检查





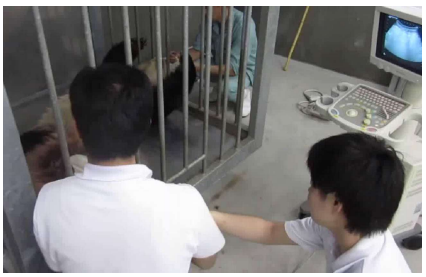
⇒ There was no notable wear of the molars with aging
没有发现伴随高龄化的臼齿的明显磨损

② Health management with husbandry training 通过受诊动作训练的健康管理

Toothbrush training
刷牙训练

② Health management with husbandry training 通过受诊动作训练的健康管理

Abdominal ultrasound scans
腹部B超检查



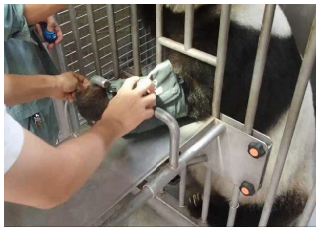
(Bladder image) 〈膀胱的图像〉

⇒ Test results 检查结果
- No ascites 无腹水滞留
- No abnormalities in the liver, colon, or bladder 肝脏、肠管、膀胱无异常

② Health management with husbandry training 通过受诊动作训练的健康管理

Echocardiography and blood pressure measurement training
心脏B超・量血压的训练

A probe is placed on the chest
在胸部上使用测量仪



A blood pressure cuff is wrapped around Tantan's front paw
在前肢上绑上测量血压用的气囊

Summary
总结

- Tantan's behavior at estrus and during pseudopregnancies and the seasonality of the changes in sex hormones in the urine changed after the cub was born; we suspect these might have been affected by living alone and aging.
  怀疑发情期・伪生产期的行动和尿液中性激素动态的季节性受生产后变动，单独饲养和年龄增长的影响。
- We treated Tantan's eye diseases using husbandry training.
  通过利用受诊动作训练的处置，进行了眼疾治疗。
- Elderly giant pandas are at risk of severe wearing of the molars, ascites, heart disease, and hypertension; therefore, we have enhanced Tantan's training to prevent these conditions.
  由于高龄个体有易发臼齿严重磨损，腹水症，心脏疾患，高血压症等风险，因此加强了预防训练。
- We want to continue working to manage Tantan's health
  继续努力做好饲养个体的健康管理。

Reference: 2016 International Conference on Giant Panda Conservation
Reports from Megan Owen (San Diego Zoo) and Liang Jialun et al. (Ocean Park Hong Kong)