The Thai Journal of Veterinary Medicine

Volume 15
Issue 3 *September, 1985*

Article 2

9-1-1985

ศาสตราจารย์ น.สพ. ดร. อายุส พิชัยชาญณรงค์

n/a

ศาสตราจารย์ น.สพ. ดร.อายุส พิชัยชาญณรงค์

ในวาระครบเกษียณอายุราชการของศาสตราจารย์ น.สพ. ดร.อายุส พิชัยชาญณรงค์ หัวหน้าภาควิชาสรีรวิทยา คณะสัตวแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย ในวันที่ 1 ตุลาคม 2528 จึงขอนำประวัติและผลงานของท่านมาตีพิมพ์ในเวชชสารสัตวแพทย์ฉบับพิเศษนี้ เพื่อระลึกถึงคุณงามความดีของท่านที่ได้อุทิศตนให้กับคณะสัตวแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย และวิชาชีพสัตวแพทย์ ศาสตราจารย์ ดร.อายุส พิชัยชาญณรงค์ จบสัตวแพทยศาสตร์บัณฑิตรุ่นที่ 9 พ.ศ. 2492 เริ่มรับราชการเป็นอาจารย์ตรีแผนกสรีรวิทยา ในคณะสัตวแพทยศาสตร์ กรมมหาวิทยาลัยแพทยศาสตร์ กระทรวงสาธารณสุข ตั้งแต่ปี พ.ศ. 2492 หลังจากที่ท่านได้ไปศึกษาต่อและสำเร็จการศึกษาระดับปริญญาโท เอก จากมหาวิทยาลัยคอร์เนลล์ ประเทศสหรัฐอเมริกา ในปี พ.ศ. 2503 และกลับมาสอนวิชาสรีรวิทยา ให้แก่นักศึกษาสัตวแพทย์จนถึงปัจจุบันนั้น ท่านได้อุทิศตนและทำประโยชน์ให้แก่ภาควิชาสรีรวิทยา และคณะสัตวแพทยศาสตร์ จุฬาลงกรณ์-มหาวิทยาลัย เป็นอย่างยิ่ง ท่านได้เป็นผู้ริเริ่มให้มีการสอนปฏิบัติการสรีรวิทยาแผนใหม่ที่ทันสมัย ทั้งทางด้านการเรียนการสอนและอุปกรณ์ที่ใช้ในห้องปฏิบัติการ ท่านอุทิศตนให้กับการเรียนการสอน และการค้นคว้าวิจัยทางด้านสรีรวิทยา ดังจะเห็นได้จากผลงานวิจัยของท่าน และผู้ร่วมงานที่ท่านสนับสนุน งานวิจัยที่ท่านได้สนับสนุนจนถึงปัจจุบันมีหลายโครงการ ทั้งทางวิทยาศาสตร์สรีรวิทยาพื้นฐาน การศึกษาวิจัยวิทยาศาสตร์การเกษตร และวิทยาศาสตร์การแพทย์ เช่น การศึกษาการทำหน้าที่ของต่อมไร้ท่อ ในปศุสัตว์ (โค กระบือ) การศึกษาเกี่ยวกับปริมาณของแร่ธาตุต่าง ๆ ในตัวสัตว์ ตลอดจนในอาหารและดิน ศึกษาอุณหภูมิของสภาวะ-แวดล้อมที่มีต่อสรีรสภาพของปศุสัตว์ ศึกษาสรีรสภาพของโคนม ศึกษาหน้าที่การทำงานของไตในสัตว์เลี้ยง เป็นต้น

ท่านเป็นกำลังสำคัญในการก่อตั้งการเรียนการสอนสหสาขาวิชาสรีรวิทยาในระดับบัณฑิตศึกษา และเป็นอนุกรรมการประสานงานบัณฑิตศึกษา ตั้งแต่ปี พ.ศ. 2524 จนถึงปัจจุบัน ซึ่งปัจจุบันสามารถผลิตบัณฑิตระดับปริญญาโทออกไปแล้วสามรุ่น ท่านเป็นกรรมการผู้ทรงคุณวุฒิพิจารณาผลงานทางวิชาการเพื่อเลื่อนตำแหน่งของคณะสัตวแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย ตั้งแต่ต้นจนถึงปัจจุบัน รวมทั้งเป็นกรรมการของมหาวิทยาลัยอื่นด้วย

นอกจากท่านได้ทุ่มเทกำลังกาย กำลังความคิดให้แก่งานด้านการเรียนการสอน และการวิจัยแล้ว ท่านยังได้อุทิศตนให้แก่งานทางด้านการบริหารโดยท่านได้เคยดำรงตำแหน่งคณบดี คณะสัตวแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย ตั้งแต่ปี พ.ศ. 2516-2520 เป็นกรรมการสภาจุฬาลงกรณ์มหาวิทยาลัย และเป็นนักศึกษาวิทยาลัยป้องกันราชอาณาจักรรุ่นที่ 17 ปี พ.ศ. 2517

งานทางด้านวิชาชีพสัตวแพทย์ ท่านเป็นที่ปรึกษาคณะกรรมการบริหารของสัตวแพทยสมาคม-แห่งประเทศไทยในพระบรมราชูปถัมภ์ เป็นอนุกรรมการให้คำปรึกษา ของคณะกรรมการควบคุมการบำบัดโรคสัตว์ กรมปศุสัตว์ ด้วยคุณงามความดีและการอุทิศตนอย่างสูงของท่าน ท่านจึงได้รับการคัดเลือกเป็นสัตวแพทย์ดีเด่นจากสัตวแพทยสมาคมแห่งประเทศไทย ในพระบรมราชูปถัมภ์ เมื่อปี พ.ศ. 2527

ศาสตราจารย์ น.สพ. ดร.อายุส พิชัยชาญณรงค์ ได้อุทิศตนเกี่ยวกับการสอนถ่ายทอดวิชาการให้แก่ศิษย์อย่างเต็มความสามารถโดยไม่เห็นแก่ความเหน็ดเหนื่อยสมกับเป็นครูที่ดี ดังที่ท่านได้ตั้งปณิธานไว้ ผลงานส่วนหนึ่งที่ท่านได้ทำการวิจัยและสนับสนุน ในภาควิชาสรีรวิทยา มีดังต่อไปนี้

Investigation on blood type, serum type, and hemoglobin type in water buffaloes **P. Loypetjra.** *Aarsbestu Inst. Sterilitesforskn. K. Vet. og. Landbohojsk. p. 221, A.B.A. 1962, 31(2) : 1061.*

Concerning with the investigation on the common antigen among the cattle and water buffaloes, and the comparison of serum and hemoglobin type to these, the 120 samples of buffalo sera from Bangkok slaughter house have been done.

A blood type determination with the reagents for routine analysis of Danish cattle in Denmark was made using a complement absorbed with blood corpuscles from the water buffaloes. This may therefore draw the conclusion that not blood type factors have been demonstrated which correspond serologically to those known in Bos taurus in the A-, C-, FV-, L-, M-, SU-, and Z systems. From the factors in the B- and R'S'- system antigens corresponding to O_3 and possibly also to I_2 and S' has been demonstrated. The studies on serum and blood corpuscles in the J system, a reaction scheme was found which corresponded to that found in Bos taurus. Therefore the water buffaloes may be assumed to possess a corresponding system.

The results obtained from serum type determination by starch gel electrophoresis, showed AA, AD, and DD types. While the hemoglobin types were A, B, and AB.

Determination of blood and plasma volume in Thai mongrel and exotic dogs by Evan's blue. **P. Loypetjra and A. Pichaicharnarong.** *Journal of Graduate School, Chulalongkorn University. (1971). 3(2) : 167.*

Determination of blood and plasma volume were performed in 53 Thai mongrel dogs aging from 5 months and 6 adults European dogs bred in this country. The total blood, plasma, and cell volume of the native dogs are 79.98 ± 19.25, 48.85 ± 18.4 and 32.42 ± 9.01 c.c. per 1 kg. body weight, while in exotic dogs are 93.79 ± 12.29, 56.69 ± 15.55, and 36.94 ± 10.5 c.c. per 1 kg. body weight respectively. The reasons for possible causes of the deviation are given. The maximal absorbance spectrum of Evans blue tinged plasma is 620 millimicrons.

The mixing time of 1% Evans blue injected intravenously has been found 10 minutes. The disapperance of this dye had been investigated in 6 Thai mongrel dogs.

Diurnal changes of acetylcholine in specific areas of rat brain. **C.A. Walker and D. Chaichareon.** *Federation Proceeding (1973). 32 (3) : 741.*

Diurnal changes in acetylcholine levels were observed for the midbrain, cortex, caudate nucleus, cerebellum and whole brain of the rat. Animals were adapted for a minimum period of three weeks to a 12 hour light - 12 hour dark photoperiod. Sprague-Dawley strains were used and all animals were supplied food and water ad libitum. Immediately after sacrificing acetylcholine was extracted in eserinized saline and analyzed via two different animal bioassay procedures (rat blood pressure, dorsal muscle of the leech). Peak concentrations for all areas analyzed were noted during the dark phase. The acrophases of caudate, cerebellum, and midbrain occurred at identical times (D_7) during the photoperiod. The sensitivity of different analytical procedures were studied and compared. The possibility that central nervous system circadian acetylcholine rhythms are associated with central-peripheral physiological activity and the circadian toxicity of specific cholinergic drugs is discussed. (Supported by a grant from the USPHS, General Research Support).

Animal production problems in Thailand. **A. Pichaicharnarong.** *Proceedings of a Panel "Tracer Techniques in Tropical Animal Production" by International Atomic Energy Agency, Viennel. (1974). 195.*

The grass samples grown in the north-eastern part of Thailand have been found to be deficient in copper, cobalt, manganese and sulphur and totally lacking in iodine and selenium. Contrary to these deficiencies,

molybdenum is in excess, i.e. 1 ppm. There is a deficiency in phosphorus.

The temperate beef and dairy cattle are susceptible to anaplasmosis and babesiosis, but the former disease can be prevented by a local vaccine.

There is a lack of well-established pasture land. Parasitic worms, especially liver fluke, cause a great economic loss to the country.

Effect of prostaglandin $F_{2\alpha}$ on corpora lutea in guinea pigs and mongolian gerbils

P. Chaichareon, P.E. Meckley, and O.J. Ginther, *Am. J. Vet. Res. (1974). 35(5) : 685.*

Corpora lutea were smaller ($P < 0.05$) in guinea pigs)Pxcgx i t lpemjb& which were hysterectomized on day 2 (day 1 = 1st day of diestrus) and were given 250 μg./day of prostaglandin $F_{2\alpha}$ ($PGF_{2\alpha}$) on days 17, 18, and 19 and necropsied on day 22 (4.03 cmm.) than in hysterectomized nontreated controls (5.91 cmm. = mean volume). Corpora lutea were smaller ($P < 0.005$) in obth uterine-intact and hysterectomized guinea pigs treated with 500 μg./day of $PGF_{2\alpha}$ on days 9, 10, and 11 and necropsied on day 14 (1.73 cmm.) than in non-treated controls (3.19 cmm.). The interaction of uterus (intact vs. removed) and dose of $PGF_{2\alpha}$ (0 vs 500 μg.) was not significant, failing to show a differential effect of $PGF_{2\alpha}$ between the uterine-intact and the hysterectomized groups. Corpora lutea were smaller ($P < 0.005$) in guinea pigs which were given a single intrauterine injection of 1 mg./kg. of $PGF_{2\alpha}$ (2.28 cmm.) than in guinea pigs which were given vehicle alone (3.82 cmm.). There was no significant difference between corpora lutea ipsilateral vs. contralateral to the injected horn.

Various doses of $PGF_{2\alpha}$ were given in a single injection to pseudopregnant (paired with a vasectomized male) postpartum Mongolian gerbils *(Meriones unguiculatus)* in which the litter was either present or absent (removed on day of parturition). Interaction of dose of $PGF_{2\alpha}$ (0, 10, 20 or 30 μg.) and litter (present or absent) was significant. The interaction was primarily due to a pronounced luteolytic effect of the 30-μg. dose of $PGF_{2\alpha}$ (0.88 mm. diameter of corpora lutea) and a partial effect of 20-μg. dose (1.31 mm.) compared to 1.79 mm. for the 0 dose and 1.81 mm. for the 10-μg. dose. The $PGF_{2\alpha}$ was ineffective at all levels in the groups with litters present.

Absorption and excretion of calcium in relation to differences in metabolic rate

N. Chaiyabutr and P.E. Jakobsen *Z. Tierphysiol., Tierernahrg. U. Futtermittelkde. (1976). 37 : 225.*

This investigation was designed to determine whether absorption and excretion of calcium can be influenced by different climatic conditions or different diets. It was found that the animals fed high iodine in the diet had an increase in urinary calcium excretion and faecal calcium and endogenous calcium excretion under all conditions, as compared with animals fed the basal and PTU diets. Animals fed the PTU diet had a lower daily endogenous faecal excretion than the other groups. The absorption of calcium from the gut did not change during the experimental period for animals kept at 6° and 20°C., but it tended to fall in animals kept at 34°C. Calcium deposition is greater than calcium loss in animals fed the PTU diet. Animals fed the high-iodine diet exhibited a high level of calcium excretion in faeces as well as in urine under all climatic conditions thus leading to a decline in the positive balance as compared with that of animals fed the Basal and PTU diets. In all animals the plasma calcium concentrations were maintained at constant levels during the period of the balance study.

The results suggest that 5 ppm of iodine in the diet influences calcium metabolism by decreasing calcium deposition and increasing endogenous and exogenous calcium excretion. The effect may be due to a change in cellular transport of calcium ions from soft tissue. Transport difficulties of calcium across the cell membrane may occur in animals fed the PTU diet.

Effects of uterus and prostaglandin $F_{2\alpha}$ on corpora lutea in mongolian gerbils and guinea pigs

D.P. Chaichareon, and O.J. Ginther *Am. J. Vet. Res. (1976). 37 : 573.*

One or both uterine horns were removed on postpartum day 6 (day 1 = parturition) in pseudopregnant gerbils. On day 16, the corpora lutea (CL) in unilaterally hysterectomized gerbils were smaller ($P < 0.05$) in the

ovary adjacent to an intact horn than in the ovary adjacent to a removed horn. The CL were smaller in uterine-intact than in completely hysterectomized gerbils.

In another experiment, the CL were smaller ($P < 0.05$) in pseudopregnant gerbils given a single intra-uterine injection of a 30- or 20-ug dose of prostaglandin $F_{2\alpha}$ ($PGF_{2\alpha}$) on postpartum day 6 and then necropsied on day 10 than in gerbils given 10-, 5-, 1-, and 0-ug doses; CL were smaller ($P < 0.005$) on the side ipsilateral to the treated horn than on the opposite side, although the interaction of dose and side was not significant.

A single subcutaneous injection (0 or 30 ug) of $PGF_{2\alpha}$ was given to pseudopregnant gerbils on postpartum day 6. Litter size was adjusted to 0, 3, or 5 young on day 1. At necropsy on day 10, the CL were smaller in gerbils given the 30-ug dose when all young were removed than when 3 or 5 young were present.

In guinea pigs given a single intramuscular injection of $PGF_{2\alpha}$ at the dose level of 3,000 ug/kg on day 7 and necropsied on day 10 of diestrus (day 1 = 1st day of vaginal closure), CL were significantly smaller than in guinea pigs which were given dose levels of 500 or 0 ug/kg. A single injection of various doses (0, 100, 500, or 1,000 ug/kg) of $PGF_{2\alpha}$ was given into 1 uterine horn in guinea pigs on day 7. At necropsy, mean CL weight in each group was significantly different from each other; the response increased as the dose increased. Mean CL weight tended to be smaller ($P < 0.1$) on the side ipsilateral to the treated horn than on the opposite side, but the interaction of dose and side was not significant.

Results indicated a uteroovarian relationship was involved in luteolysis in Monogolian gerbils and the relation ship was predominantly on a local or unilateral basis operating between a uterine horn and the adjacent ovary. The efficacy of $PGF_{2\alpha}$ administered through a local verus a systemic route in both gerbils and guinea pigs implied that a predominantly local uteroovarian pathway for $PGF_{2\alpha}$-induced luteolysis existed in these species.

Factors which affect the relative contributions of ovarian and uterine arteries to the blood supply of reproductive organs in guinea pigs **D.P. Chaichareon, J.H. Rankin, and O.J. Ginther** *Biol. of Reprod. (1976). 15 : 281.*

The contributions of the ovarian and uterine arteries to the arterial supply of uterus and ovaries was studied in guinea pigs on Days 0, 3, 4, 7 and 11 of the estrous cycle and Day 11 of pregnancy (Exp. 1) and on Days 7 and 11 of diestrus and pregnancy (2 x 2 factorial, Exp. 2). Methodology involved simultaneous injection of microspheres labeled with different isotopes into the left ventricle (A-spheres) and into the aorta between the origins of ovarian and iliac arteries (B-spheres). In all guinea pigs, the ovaries and oviducts contained only A-spheres indicating that the ovarian artery provided all of the arterial supply on all days studied. The ratio of A/B spheres was not significantly different between the cervix and caudal third of the uterus and it was assumed, therefore, that the uterine artery provided all of the arterial supply. The A/B ratio was significantly greater for the cranial third of the uterus than for the middle third and was greater for the middle third than for the caudal third. The percent blood contributed by the ovarian artery was calculated to be 90 percent for the cranial third and 44 (Exp. 1) and 42 percent (Exp. 2) for the middle third. These results demonstrated that the direction of blood flow in the prominent uteroovarian arterial anastomosis was toward the uterus.

In Exp. 2, the percent contribution of the uterine artery to the blood supply to the cranial third of the uterus increased when the guinea pigs became pregnant especially on Day 11 and on the side ipsilateral to the ovary with the greater number of CL presumably reflecting the development of implantation sites. The contribution of each artery to the blood flow to each organ or segment of the reproductive tract was also expressed in Exp. 2 as a percent of blood flow to the kidneys. The contribution of the ovarian artery to blood flow to the cranial and middle segments of the uterus increased significantly toward the end of diestrus. The contribution of the uterine artery to the middle segment increased significantly at Day 11 in pregnant guinea pigs. An analysis of the contribution of each artery (ovarian and uterine) to the total blood flow summed over all genitalia (ovaries, oviducts and uterine horns) indicated that on both Days 7 and 11 the ovarian artery was the major contributor in cycling guinea pigs, whereas in pregnant guinea pigs at Day 11, the uterine artery was the major contributor. The supply from the principal contributing artery (ovarian artery in cycling guinea pigs, uterine artery in pregnant guinea pigs) was greater at Day 11 than at Day 7. These results indicate that the mechanisms for increased blood flow to the paired genitalia in late diestrus were exerted through the ovarian artery. However, on the corresponding day of pregnancy the mechanisms for increased flow were exerted through the uterine artery.

Effects of intrarenal artery perfusion on kidney function in the dog **N. Chaiyabutr and A. Malila** *Thai J. Vet. Med. (1977). 7(1) : 68.*

Effects of intrarenal artery perfusion on kidney function in the dog. Either the hypertonic solutions (537 mOsm/kg) or the hypotonic solution (27 mOsm/kg) were infused directly into left or right renal artery at the rate of 2.5 ml/min instead of the control isotonic saline solution (280 mOsm/kg). During experimental period the contralateral kidney received isotonic saline solution continuously as during the control period. Infusion of hypertonic saline solution, raising sodium concentration in that renal artery by 4.59 ± 1.18 (SD) uEq/ml, caused a significant increase in V, $U_{Na}.V$ and $U_{Cl}.V$. Hypertonic lithium and rubidium chloride of the same osmolality also caused a significant increase in V and $U_{Cl}.V$ but non-significant increase in $U_{Na}.V$. When the systemic effect of hypertonic choline chloride was ruled out, it caused a non-significant increase in $U_{Na}.V$. All hypertonic perfusates induced osmotic diuresis judging from a significant increase in C_{osm}. Infusion of hypotonic saline solution (27 mOsm/kg) lowering renal arterial plasma sodium concentration by 4.94 ± 2.03 (SD) uEq/ml, caused a decrease in V, $U_{Na}.V$ and $U_{cl}.V$. Hypotonic choline, lithium and rubidium chloride of the same osmolality caused slight increase in $U_{Na}.V$ and V. In the experimental kidney there were no significant different in GFR, ERPF, $U_K.V$, Hct, MABP, plasma volume and plasma protein concentration in comparison to the control value. These results suggested that kidney can function as primary effector to various perfusates introduced directly into them. Each can function independently of the other. The changes that occur do not depend on just the sodium concentration or the osmolality. The transport mechanisms together with their capacities will initiate and determine the pattern and the degree of diuresis.

Vascular dynamics of the reproductive tract in the female rhesus monkey: relative contributions of ovarian and uterine arteries. **W.B. Wehrenberg, D.P. Chaichareon, D.J. Dierschke, J.H. Rankin, and O.J. Ginther.** *Biol. of Reprod. (1977). 17: 148.*

The anatomical descriptions of the vasculature of the uterus and ovaries in rhesus monkeys do not provide quantitative information about the relative contributions of the ovarian and uterine arteries to the blood supply of the reproductive tract. To identify the major source of arterial blood supply to these organs under varying reproductive conditions, monkeys were studied during nonpregnant (n = 7), early pregnant (Days 13-18, n = 6), and late pregnant (Days 149-154, n = 4) states. Microspheres, labelled with different isotopes, were injected simultaneously into the left ventricle and the aorta midway between the origin of the ovarian artery and the terminal bifurcation of the aorta. The resulting ratio of microspheres in various organs or segments of the reproductive tract was indicative of the source of arterial blood.

There was no significant difference in the source of arterial blood between nonpregnant and early pregnant monkeys; under both circumstances the uterine artery supplied 91 to 100 percent of the arterial blood reaching all segments of the reproductive tract. However, during late pregnancy, blood supply via the uterine artery to the ovaries and oviducts decreased ($P < 0.01$) to 9 and 5 percent, respectively; the average uterine arterial contribution to the cranial segment of the uterus was reduced to 63 percent and that to the middle and caudal uterus was unchanged. Considering all stages studied, there was no unilateral difference in distribution of arterial blood to the reproductive tract even in the presence of an active corpus luteum.

Thus, the ovarian artery appears to be largely nonfunctional in supplying blood to the reproductive tract except during late pregnancy when the ovarian artery becomes dominant in providing blood to the ovaries and oviducts.

Resin triiodothyronine-^{125}I uptake in different breeds and cross-breeds of cattle in a tropical climate. **N. Chaiyabutr, P. Loypetjra, A. Pichaicharnarong, and D. Durdevic.** *Acta Vet. (Beograd). (1977). 27(4) : 191.*

Thyroid gland activity in relation to the breed and sex of cattle was assessed using a commercial kit for the determination of RT_3U value (triiodothyronine resin uptake test).

The mean RT_3U values were: 28.8%, 24.7%, 32.3%, 31.9% for Red Dane (RD), Red Sindhi (RS), RD/RS (75:25), RD/RS (50:50) heifers, and 30.6 and 32.7% for RS and RD bulls respectively.

RT_3U index was 0.96 in RD, 0.82 in RS, 1.06 in RD/RS (75:25) and RD/RS (50:50) heifers, and 1.09 and 1.02 for RD and RS bulls respectively.

RT_3U values in all breeds and their cross-breeds studied were found to be lower than those reported for other species of domestic animals.

Differences of RT_3U value in regard to breed and sex of animals were recorded. The lowest RT_3U value was found in Red Sindhi heifers, and the highest in RD/RS (75:25) heifers. The RT_3U values were higher in the bulls than in the heifers of the same breed. The same conclusion may be drawn out if the results of RT_3U index are analysed.

Effect of L-thyroxine and propyl-thiouracil on electrocardiogram of dog **P. Loypetjra and N. Chaiyabutr.** *Thai J. Vet. Med. (1978). 8(2) : 64.*

The effects of L-Thyroxine and propyl thiouracil on electrocardiographic patterns (ECG) have been studied in dogs. Ten dogs with induced hyperthyroidism demonstrated electrocardiographic changes when compared with ten control dogs : high and peaked P wave, deep Q and S with slurring of the S-T segment (depression and elevation). Changes in the waves of the ECG in dogs treated with propyl thiouracil were considered to be a secondary effect of anemia.

The influence of dietary iodine and enviromental temperature on the activity of mitochondria in liver and kidney **N. Chaiyabutr and P.E. Jakobsen** *Z. Tierphysiol., Tierernahrg. U. Futtermittelkde. (1978). 40 : 225.*

It was found that both effect of temperatures and diets influence metabolic changes in rabbits. In animals fed basal and PTU diets (propyl-thiouracil diets) at 34 ℃ for 4 weeks the metabolic response showed a marked reduction in feed intake and body weight, compared with animals fed at normal temperatures. In the animals fed the iodine diet, there was an increase in daily food consumption and weekly body weight gain at 34 ℃. This indicates a rise in metabolic activity in this case. Studying the activity of kidney mitochondria of the three groups of animals using succinate as a substrate revealed that the P/O ratio tends to decrease in animals kept at 6 ℃ while the RCR value was not altered by changing conditions or produced by the different diets. At the temperature of 6 ℃ both the P/O ratios and the RCR values of liver mitochondria using succinate as a substrate decreased in the group of rabbits fed the basal and iodine diets, but were not significantly different in the group fed the PTU diet.

In the experiment on kidney mitochondrial activity using α-ketoglutarate as a substrate it was found that both the P/O ratios and the RCR values from animals fed basal and PTU diets at 6 ℃ decreased slightly as compared with animals fed at 20 ℃ and 34 ℃. In liver mitochondria using α-ketoglutarate as a substrate a significant decrease in the P/O ratio and the RCR value was found for both rabbits fed the basal and the iodine diets at 6 ℃. In the group of rabbits fed the PTU diet, the P/O ratio also decreased but the fall was not significant.

These results suggested that the activity of succinate dehydrogenase in liver mitochondria increases in animals fed basal and iodine diets at 6 ℃. The enzyme dehydrogenase involved in oxidation of α-ketoglutarate which is localized in the outer membrane of mitochondria seems to be affected by different temperatures and diets as compared with succinate dehydrogenase localized in the matrix. The kidney mitochondria activity is less sensitive than that of liver mitochondria.

Mitochondrial respiration and phosphorylation due to the tightness of their coupling may respond differently depending on the degree of thyroid activity.

Determination of serum thyroxine concentration in cattle using two different procedures of competitive protein-binding analysis. **N. Chaiyabutr, Prapa Loypetjra, A. Pichaicharnarong and D.J. Djurdjevic.** *Acta Vet. (Beograd). (1978). 28(3) : 107.*

Total serum thyroxine concentration was determined in 20 head of cattle using two different methods of competitive protein-binding analysis: method A-a commercial test kit *Ultragnost* T_4, and method B-described by Ekins et al. (1969).

The average total serum thyroxine concentration determined by method A was 4.7 ± 1.9 ug/100 ml, and 4.1 ± 1.7 ug/100 ml for method B. A significant positive correlation was found between the results obtained by the two methods used (r = 0.610). The commercial test kit procedure has several advantages in comparison to the Ekins method, but it is relatively expensive. Therefore, the Ekins method, which has approximately the same precision, should be, chosen for studies in a large number of animals, especially in laboratories with low budgets.

The precision and accuracy of both methods, as well as their advantages and disadvantages are discussed.

Fatal heart lesions caused by foot and mouth disease virus type O in pigs. **Lek Ousavaplanghai, M.L. Akanee Navarat, P. Loypetjra, P. Verakool, and P. Arjsongkoon.** *Thai Vet. Med. Assoc. (1978). 29(3) : 19.*

During the year 1977, an outbreak of FMD in Nakornpathom and neighboring provinces, many pigs died of the disease. The effected animals showed symtoms of fever, salivation, pain of interdigital area, lameness, hyperpnea, convulsion and cry just before death. Mortality rate was 10-15 percents. Vesicles and ulcerated wounds were observed on coronary bands, the tongue and in interdigital areas. The myocardium showed numerous whitish-gray streaks which were much more pronounced on the right ventricle. Microscopic lesions of the heart revealed progressive interstitial myocarditis and severe myocardial degeneration. The results of electrocardiogram showed delayed electrical waves which indicated myocardiopathy especially that to the right ventricle thus corresponded with the heart lesions. It may be concluded that the death of infected animals without bacterial complication was due to the heart lesions caused by FMD virus type O.

Recommended anesthetic in poultry (chicken) **D. Chaichareon and P. Tuntivanich.** *Thai J. Vet. Med. (1980). 10 : 173.*

In restraining poultry for both preclinical and clinical purposes, numbers of anesthetic agents easily obtained in the market were tested in chicken. Intraperitoneal administration (i.p.) of 10% thiopental at the dose of 75 mg/kg resulted in anesthetization in 5 to 17 minutes which lasted for 20 to 30 minutes. At the dose of 50 mg/kg, hypnosis was produced. Similar dosages and concentration of Vetanarcol i.e. 50 mg/kg and 75 mg/kg, i.p., were 75 percent fatal during anesthetization. When the dose was decreased to 25 mg/kg, the chicken were hypnotized. Inhalation of ether via mask was efficient however, careful addition of ether was necessary. When the endotracheal tube was inserted, a closed system inhalation anesthetic machine with ether failed to maintain the anesthetization. Ketalar, at the dose of 5 mg/kg, i.p., was ineffective.

Effect of the relative locations of embryo and corpus luteum on embryo survival in cattle **Marcelo R. Del Campo, R. F. Rowe, D. Chaichareon and O.J. Ginther** *Theriogenology. (1980).*

The objectives were to determine if early in gestation (<day 30) an embryo in the ipsilateral horn increases the survival rate of an embryo in the contralateral horn and if later in gestation (>day 30) the presence of two embryos adversely affects the survival of both embryos in cattle. The experiment involved surgical embryo transfer. Sixty Holstein heifers were assigned to 4 groups: group 1) sham bilateral transfers, group 2) one embryo inserted ipsilateral to CL, group 3) one embryo inserted contralateral to CL, and group 4) one embryo inserted into each horn. Diagnosis of pregnancy and ovarian activity were recorded from day 7 or 8 (surgery) to day 110. Results indicated that the rate of embryo survival early in pregnancy (<day 30) in heifers with the embryo inserted con-

tralateral to the CL (33%, group 3) was increased (p = .05) when an embryo was also inserted into the ipsilateral horn (67%, group 4). The hypothesis that the ipsilateral embryo would have a protective effect on the contralateral embryo was therefore supported. This may have been due to the prevention of luteolysis by the ipsilateral embryo. However, when an embryo was present in each horn considerable loss occurred>day 30 resulting in a low survival rate by day 110 (27%). The hypothesis that the presence of two embryos later in gestation would decrease the survival probability of both embryos was therefore supported.

The utilization of glucose for the synthesis of milk components in the fed and starved lactating goat in vivo **N. Chaiyabutr, A. Faulkner, and M. Peaker** *Biochem. J. (1980). 186 : 301.*

1. [U-^{14}C] Glucose and [3-^{3}H] glucose were infused into fed and starved lactating goats in order to study glucose metabolism in the mammary gland. 2. Glucose carbon was oxidized and metabolized to milk lactose, citrate and triacylglycerol in the lactating goat udder. 3. Recycling of glucose carbon in the lactating animal accounted for 10-20% of the total glucose turnover in the whole animal. Recycling of glucose 6-phosphate in the udder accounted for about 25% of the glucose 6-phosphate metabolized. 4. Flux of glucose 6-phosphate through the pentose phosphate pathway was sufficient to account for 34% of the NADPH required for fatty acid synthesis in the gland in the fed animal. 5. Net metabolism of glucose 6-phosphate via the pentose phosphate pathway accounted for 17.8 and 1.2% of the glucose phosphorylated by the mammary gland in the fed and starved animal respectively. Metabolism of glucose 6-phosphate via the pentose phosphate pathway was sufficient to account for all the CO_2 produced from glucose in the fed animal, but only 17% of the CO_2 produced from glucose in the starved animal.

Effects of starvation on the cardiovascular system, water balance and milk secretion in lactating goats **N. Chaiyabutr, A. Faulkner, and M. Peaker** *Res. Vet. Sci. (1980). 28 : 291.*

During starvation in the lactating goat, cardiac output, stroke volume, mammary blood flow, blood volume and the rate of milk secretion decreased markedly; total peripheral resistance and haematocrit increased while arterial blood pressure and plasma osmolality remained unchanged. Water consumption decreased markedly and the animals went into negative water balance even though water was available throughout.

Effects of starvation on cardiovascular function (including the mammary circulation) and Water balance in pregnant goats **N. Chaiyabutr, A. Faulkner, and M. Peaker** *Qt. J. Exp. Physiol. (1980). 65 : 207-216*

In conscious goats, starved for 48 hr, in mid-pregnancy (70 days) cardiac output and blood volume decreased; total peripheral resistance increased; heart rate, stroke volume, blood pressure, mammary blood flow and mammary resistance were not significantly affected. In late pregnancy (132 days) cardiac output, heart rate, blood volume and mammary blood flow fell; peripheral resistance increased; stroke volume and blood pressure were not significantly affected. In mid-pregnancy, water consumption fell and the animals entered a stage of negative sensible water balance which persisted for both days of starvation. A similar change was obtained on the first day in late-pregnant goats, but on the second day water consumption increased and positive water balance was restored.

Cardiac output, heart rate, blood volume and mammary blood flow were higher in fed late-pregnant than in fed mid-pregnant goats, total peripheral resistance was lower while there were no significant changes in stroke volume or blood pressure. Indications of correlations between litter size and cardiac function were obtained.

The results are compared with previous studies on the effects of starvation in lactating animals and are discussed in relation to the control of cardiac function and mammary blood flow in pregnancy and lactation.

Changes in water balance and blood volume related to sudden cessation of milking in goats.

N. Chaiyabutr. *J. Sci. Soc. Thailand. (1981). 7(4) : 170.*

Water balance and plasma vol. were measured for 4 days before and 4 days after cessation of milking in 4 goats in late lactation (28-32 wk). After cessation of milking, mean daily water intake decreased from 5.3 to 4.5 l ($P < 0.001$), coinciding with a decline in water loss in faeces and urine ($P < 0.05$). Decreased intake was greatest in high-yielding animals. Apparent water balance remained positive after milking was stopped since there was no water loss in milk. Plasma vol., plasma osmolality, packed cell vol. and digestibility of DM were not altered by cessation of milking. Changes in blood vol. and osmolality and other vascular adjustment may be too gradual to be evident in this short period.

Changes of renal functions in experimental hyperthyroid and hypothyroid dogs **N. Chaiyabutr** *Acta Vet. (Beograd). (1981). 31(5-6) : 251.*

Changes of renal function in hyperthyroid and hypothyroid conditions were studied in 24 mongrel dogs. Hypothyroid and hyperthyroid animals were produced by giving propylthiouracil (PTU) (500 mg per day per animal) and L-thyroxine sodium (T_4) (1 mg per day per animal) respectively for four weeks. There were significatly higher serum thyroxine concentrations, urine flow (V), urinary calcium ($U_{Ca}V$) and sodium excretion ($U_{Na}V$) in T_4 fed dogs. The response in increase in V, $U_{Ca}V$ and $U_{Na}V$ was independent of glomerular filtration rate, renal blood flow and renal resistance. The PTU fed animals had significantly lower serum thyroxine levels and haematocrit values. Renal blood flow significantly decreased together with an increase in renal resistance in hypothyroid animals. The decrease in glomerular filtration rate, filtration fraction and concentration of electrolytes excretion of hypothyroid animals depended on changes of renal haemodynamics.

Metabolic significance of milk glucose **A. Faulkner, N. Chaiyabutr, M. Peaker, D.T. Carrick, and N.J. Kuhn.** *J. Dairy Res. (1981). 48 : 51.*

The free glucose concentration in the aqueous phase of samples of goat, sheep, cow, rat and rabbit milk was about 0.1-0.3 mM, while that in human milk was about 2 mM. During starvation the glucose concentration of goat milk fell considerably (by about 80% in 2d) in parallel with the decreased rate of lactose production. With rats fed ad lib., glucose concentration in the milk was greater at 12.00 h than at 18.00 h, when lactose synthesis has been shown to decrease. 3-0-Methyl-D-glucose injected into the goat mammary gland via the teat canal specifically entered the blood. These findings support the idea that glucose equilibrates across the apical membrane of mammary secretory cells, so that milk glucose concentrations reflect intracellular glucose concentrations.

Changes in the concentrations of the minor constituents of goat's milk during starvation and on refeeding of the lactating animal and their relationship to mammary gland metabolism

N. Chaiyabutr, A. Faulkner and M. Peaker *Br. J. Nutr. (1981). 45 : 149.*

1. Changes in the concentrations of the minor constituents of goat's milk were observed during 48 h starvation and on refeeding.
2. The concentrations of hexose phosphate and UDP-hexoses increased during starvation and decreased on refeeding.
3. The concentrations of phosphoenolpyruvate and glycerate 3-phosphate decreased during starvation and increased on refeeding.
4. Isocitrate: 2-oxoglutarate increased during starvation and decreased on refeeding.
5. Changes in the minor constituents of milk can be explained in terms of metabolic changes occurring in the mammary gland during starvation. It is proposed that changes in the concentrations of these metabolites in milk reflect changes in their concentrations in the cytosol or Golgi vesicles of the mammary gland.

The use of an exteriorized artery for studies in transplanted mammary gland. **N. Chaiyabutr.** *Thai Vet. Med. Assoc. (1981). 32 : 121.*

This report describes the technique for transplanting one mammary gland of lactating goat to the neck, with the pudic (mammary) artery and vein anastomosed to the carotid artery and jugular vein respectively. An autotransplantation was successful in six operations and there was no significant difference between the milk yield of the transplanted and control (in situ) glands after operation. The further preparation by exteriorization of anatomosed blood vessels were recorded. An exteriorization as a skin-covered loop, for the jugular vein above the anastomosis was successful, and for the artery which supplied the transplant was 66%. These observations were compared with usefulness of an exteriorization of the artery above the plate.

Observations on heart rate in swamp buffaloes using two different measurements **N. Chaiyabutr, S. Loahvirapanich, S. Chanpongsang, P. Loypetjra, and A. Pichaicharnarong.** *Thai J. Vet. Med. (1981). 11(4) : 291.*

Two different measurements were used for determining the heart rate of eight swamp buffaloes. For comparison, the heart rate was detected by palpating the pulse of the external iliac artery through the wall of rectum (R.P.) and recording electrocardiogram (ECG). Heart rate was found to be significantly higher when the former method was used than those obtained by the latter. The measurements of heart rate was carried out at different degree of ambient temperature. The heart rate was increased when the ambient temperature was high. Some factors which influence the results are discussed.

Thyroid activity of swamp buffaloes in Thailand **P. Loypetjra, N. Chaiyabutr, S. Usanakornkul, A. Pichaicharnarong, and D.J. Djurdjevic** *Acta Vet. (Beograd) (1981). 31(1) : 13.*

The thyroid gland is closely involved in the regulation of metabolism, growth and reproduction of animals. Papers concerning thyroid activity of swamp buffaloes are quite limited. The objective of this study was to evaluate the thyroid activity by determining total serum T_4 using a competitive protein binding method (CPB). The RT_3U value was also determined. The average total serum concentration of T_4 in 59 buffaloes was 69.59 nmol/l, and the average RT_3U value was 46.17%. the effect of sex and age of the swamp buffaloes on the serum concentration of thyroxine and on the RT_3U value are considered.

The thyroid activity of swamp buffaloes inhabiting non-goitrous and goitrous areas in Thailand **A. Pichaicharnarong, V. Chairuktum, T. Vongsomboon, P. Loypetjra, N. Chaiyabutr, T. Bhanaseri, and D. Durdevic.** *Acta Vet. (Beograd). (1982). 32(5-6) : 253.*

The average total serum T_4(D) of 89 swamp buffaloes in a non-endemic goitrous area at Chol Buri was 98.71 ± 3.99 nmol/l which was significantly higher than the 57.40 ± 3.47 nmol/l found in 79 buffaloes at Phrae at a 99.9% confidence level. However mean total T_3(RIA) in the serum of 89 buffaloes at Chol Buri was 2.44 ± 0.07 nmol/l while the value for the same number of buffaloes in Phrae was 2.20 ± 0.08 nmol/l.

The RT_3U values correlated with serum T_4(D) and T_3(RIA), buffaloes in Chol Buri being slightly higher (33.56 ± 0.50%) than those at Phrae (32.30 ± 0.34 %).

Thyroid activities of non-pregnant, pregnant, post-partum and newborn swamp buffaloes **A. Pichaicharnarong, P. Loypetjra, N. Chaiyabutr, S. Usanakornkul, and D.J. Djurdjevic** *J. agric. Sci. (Camb). (1982). 98 : 483.*

The average serum T_4(D) of nine non-pregnant buffaloes was 5.5 ± 1.4 ug/100 ml. It increased slightly to 6.2 ± 4.2 ug/100 ml in 37 6-7 month pregnant buffaloes. Nevertheless the difference was not significant. When the pregnancy reached 8-9 months, the T_4(D) was 9.0 ± 3.8 ug/100 ml which was significantly higher than

that at 6-7 months ($P<0.01$). At full term (9-10 months), T_4(D) decreased to 3.6 ± 2.6 ug/100 ml which was significantly lower than that at 8-9 months ($P<0.001$).

In 1 month post-partum buffaloes, the average T_4(D) was 5.1 ± 3.4 ug/100 ml, while T_4(D) of 1-month-old buffalo calves was very high, i.e. 13.6 ± 3.2 ug/100 ml.

The total serum T_3(RIA) of late-pregnant buffaloes decreased markedly from that of 8-9 month pregnant ($P<0.001$). At 1 month post-partum, T_3 rose to 143.4 ± 33.0 ng/100 ml whcih was significantly higher than that at late pregnancy ($P<0.001$). The mean serum T_3(RIA) of 1-month-old buffalo calves was relatively high, i.e. 281.0 ± 106.2 ng/100 ml which was significantly higher than 143.4 ± 33.0 ng/100 ml of their dam buffaloes ($P<0.001$) at the same period of time.

The RT_3U values of 6-7 (35.9 ± 4.2%) and 8-9 (34.7 ± 2.0%) month pregnant animals were highly significantly different from 31.1 ± 3.1% of the full-term pregnancy ($P<0.001$).

Glucose metabolism in vivo in fed and 48 h starved goats during pregnancy and lactation
N. Chaiyabutr, A. Faulkner and M. Peaker *Br. J. Nutr. (1982). 47 : 87.*

1. Glucose turnover (i.e. glucose entry and utilization rates) in fed and 48 h starved goats during pregnancy and lactation was determined using a continuous infusion of [U-^{14}C]- and [3-^{3}H] glucose.
2. Glucose synthesis and utilization increased during pregnancy and lactation in fed but not in starved goats.
3. Recycling of glucose-C was approximately 10% in fed animals and 15-20% in starved animals and was unaffected by the stage of pregnancy of lactation.
4. Plasma glucose concentrations were maintained during pregnancy and lactation in fed goats but decreased during 48 h starvation in pregnant goats. Little change was seen in the plasma concentration of lipids and their metabolites during pregnancy and lactation in fed goats, but increases were observed after 48 h starvation.
5. The control of glucose metabolism in ruminants during pregnancy and lactation is discussed.

Comparison of thyroid hormone levels in red dane and red sindhi cattle. **N. Chaiyabutr, P. Jarikphakorn, P. Loypetjra, and A. Pichaicharnarong** *Thai J. Vet. Med. (1982). 12(4) : 263.*

Thyroid gland activity in relation to the breed and sex of cattle in tropical climate was studied. The blood serum form four groups of two pure bred cattle (Red Dane heifer, Red Sindhi heifer, Red Dane bull, Red Sindhi bull) and three groups of two-breed cross cattle (RD : RS (75 : 25) heifer, RD : RS (50 : 50) heifer, RD : RD (75 : 25) lactating cattle) were used in this study. Differences of T_4, T_3 and RT_3U values regard in to breed, sex and lactating animals were recorded. The RS heifer had a significant lower RT_3U value and a higher T_4 value than the RD and cross-breed heifers. The T_4 and RT_3U values were higher in the bulls than in the heifer of the same breed. The lowest T_4 value was found in lactating animals (RD : RS, 75 : 25). These data indicate that Bos taurus and Bos indicus cattle have different activities of thyroid physiology and adaptation under the same high ambient temperature.

The effects of anticoagulants on osmotic fragility of erythrocytes of swamp buffaloes.
N. Chaiyabutr, S. Pondeenana, P. Loypetjra, and A. Pichaicharnarong. *T. V. M. A. (1982). 33(2-4) : 91.*

The effects of anticoagulants on osmotic fragility of erythrocytes were investigated on samples from healthy adult bull buffaloes and cattle. Mean corpuscular fragility (MCF), i.e. the concentration of NaCl producing 50% hemolysis, was calculated. after probit transformation of degree of hemolysis obtained at various salt concentration. The range and mean values for MCF for swamp buffaloes using heparin, oxalate and EDTA were 0.53 to 0.54% NaCl, while a marked increase in MCF by 0.59% NaCl was seen in blood sample using NaF. The effects of anticoagulants on erythrocyte osmotic fragility were also investigated in cattle. No significant differences for MCF values were apparent among samples using different types of anticoagulants. The mean value for MCF for cattle was 0.51% NaCl. These findings suggest that erythrocytes of cattle have more resistance to osmotic lysis as compared to buffaloes.

The range and mean values of the isotonicity for blood of swamp buffaloes using heparin, oxalate and EDTA were 0.89-0.92% NaCl concentration. It was found that the hypotonic range of the absolute value of NaCl concentration was higher in blood with NaF. The effect of NaF caused a decrease in plasma specific gravity and plasma protein concentration of both buffaloes and cattles. Possible changes in plasma protein concentrations were found to be a decrease in plasma fibrinogen concentration. The erythrocyte sedimentation rate (ESR) for buffaloes was measured by Westergren method. Heparin, EDTA and oxalate would not alter the ESR more than 90 m.m. for the period 24 hr. The ESR is low in blood sample using NaF, the fall of erythrocytes is less than 4 m.m. for the period 24 hr. It was suspected that a disturbance of ESR of blood using NaF was due to the alteration of the electrical charges on the erythrocytes.

Effect of heat stress on renal urea excretion of swamp buffalo. **N. Chaiyabutr, S. Chanpongsang, P. Loypetjra, and A. Pichaicharnarong** *Proceedings of the Preconference Symposium of the 5th World Conferece on Animal Production. Tsukuba, Japan, 1983.*

Five heifer swamp buffaloes, 3-4 years old weighed 283-356 kg were used to study the effect of heat exposure on renal urea excretion. An acute period of heat with a duration of 4 h. direct sun exposure (1000h to 1400h, maxmium ambient temperature 40.2°C, dry bulb) was designed. During experiments relative humidity values were averaged 63 ± 10% (SD). The temperature humidity index (THI) increased in a parallel manner with ambient temperature. The peak mean THI at 1400 h was 94 ±7 (SD).

In nonshaded buffaloes there were an increase in cardiorespiratory frequency, rectal temperature stepwise with increase in environmental temperature. After 4 hours exposure to the sun the packed cell volume decreased be approximately 1% and the rate of urine flow slightly decreased from 8.5 ± 3.6 (SD) to 7.0 ± 3.4 (SD) ml/min. as compared with shaded buffaloes. No acute effect was observed on the inulin clearance (GFR) and renal urea clearance during sun exposure. Plasma urea concentration was relatively unchanged throughout the period of experiment. The fraction of filtered urea was rather constant averaging 39% of GFR. During sun exposure urinary and fractional excretion of Na+ increased while significantly decreased for K^+. These results indicate that the pattern of renal excretion of urea, sodium and potassium is not similar in heat stress buffalo. In nonshaded buffaloes urea U/P ratios increased by approximately 20% during the fourth hour of sun exposure. With regard to protein metabolism, the concentration of total plasma protein and plasma endogenous creatinine of nonshaded buffaloes significantly increased but nonsignificant increase in urea excretion. These findings indicating buffalo's kidney play a role in regulation and conservation of urea during acute heat exposure.

Renal function studies in normal and heat stressed swamp buffalo **N. Chaiyabutr, S. Chanpongsang, P. Loypetjra, A. Pichaicharnarong** *Proceedings the 5th world Conference on Animal Production. Tokyo, Japan, (Aug. 14-19), 1983.*

During the 4h of sun exposure in the buffalo, cardiorespiratory frequency increased markedly with relative to an increase in THI and rectal temperature. Acute heat stress had no effect on PCV, plasma and urine osmolality, plasma Na,K, and Cl concentrations and rate of urine flow. Renal blood flow and plasma flow significantly increased in the nonshaded buffalo whereas no significant changes in GFR. Urinary excretion for Na increased but for K and Cl decreased, indicating the buffalo's kidney play a role of conservation of both salt and water during heat exposure.

The determination of copper, cobalt and selenium levels in sera of swamp buffaloes in various regions of Thailand **A. pichaicharnarong, P. Loypetjra, N. Chaiyabutr, S. Chirawongaram, T. Wongsomboon, S. Usanakornkul, and K. Sirisena** *Thai J. Vet. Med. (1983). 13(4) : 260.*

Sera of 26 swamp buffaloes from Cholburi, Surin and Prae were determined for Cu, Co and Se by the method of neutron activation and chemical seperation. The average level of Cu was 0.99 ± 0.19 ug/ml. The Co which could be analyzed from the animals inhabited in Cholburi only was 0.059 ± 0.037 ug/ml. The average value of Se was 0.05 ± 0.02 ug/ml.

A survey of the selenium status of buffaloes and cattle in the northeastern part of Thailand
N. Chaiyabutr, P. Loypetjra, and A. Pichaicharnarong. *Thai J. Vet. Med. (1983). 13(2) : 93.*

The survey of the selenium status of buffaloes and cattle was carried out in rural area of Nakhon Ratchasima province, the northeastern part of Thailand. One hundred buffaloes and one hundred cattle were examined. Buffaloes and cattle in relation to sex, age and conditions of lameness in animals were assessed using ^{75}Se-seleno-methionine for the determination of erythrocyte uptake ^{75}Se value. The mean erythrocyte uptake ^{75}Se values were 12.9 ± 3.3 and 15.3 ± 3.8% for normal female and male buffaloes respectively. The erythrocyte uptake significantly increased to 15.7 ± 3.2 and 18.1 ± 2.9% ($P < 0.01$) for animals that showed sign of lameness in both female and male buffaloes respectively. The lame conditions occuring in both lactating and non-lactating buffaloes also showed a significant increase in erythrocyte uptake ^{75}Se. No significant differences of erythrocyte uptake were observed among age, sex and lameness of cattles. The erythrocyte uptake ^{75}Se of blood cell from cattles were significantly higher than those of buffaloes. It was suspected that an intracellular compositions which specificity for selenium in red blood cell were different between buffaloes and cattle.

Effects of exogenous glucose on glucose metabolism in the lactating goat in vivo **N. Chaiybutr, A. Faulkner, and M. Peaker** *Br. J. Nutr. (1983). 49 : 159.*

1. Glucose turnover in fed and 48 h-starved lactating goats was determined during a glucose load of 500 umol/min using a continuous infusion of [U-^{14}C]- and [3-^{3}H] glucose.
2. Endogenous rates of irreversible glucose turnover (i.e. total rates of irreversible glucose turnover minus the rate of exogenous glucose supply) were depressed during glucose loading by 14 and 62% in the fed and starved animals respectively.
3. Plasma glucose concentrations increased significantly by 57 and 88% in the fed and starved goats respectively. Plasma insulin concentrations increased by 108 and 128% in the fed and starved animals respectively.
4. Milk yields increased significantly (41%) in the starved animals during glucose loading, but were unaffected in fed animals.
5. In both the fed and 48 h-starved goats, mammary glucose metabolism via glycolysis and the pentose phosphate pathway appeared to be stimulated by glucose loading.

The thyroid activity of asiatic elephants in Thailand **A. Pichaicharnarong, P. Loypetjra, N. Chaiyabutr, V. Komonmena, S. Usanakornkul, V. Boonnamsiri, and C. Devakul.** *Acta Vet. (Beograd). (1983). 33(2-3) : 73.*

Values of serum T_3 and T_4 were determined by radioimmunoassay in 58 normal Asiatic elephants (Elephas maximus, Linnaeus 1758) with ages ranging from 1 to 80 years. The mean concentrations of serum T_4 and T_3 were 113.6 ± 27.0 nmol/l and 1.8 ± 0.7 nmol/l respectively. The RT_3U values (resin triidothyronine-^{125} uptake) were assessed in 65 elephants. The mean value was 30.1 ± 3.8%. Both serum T_4 and T_3 decreased with age. The RT_3U of 1-10 year-old elephants was higher than that of older elephants, but there was no statistical difference between any age range. Details of the effects of sex and age of the Asiatic elephants on the values of T_3 (RIA), T_4 (RIA) and RT_3U are discussed.

Ionic composition in erythrocytes of swamp buffaloes and cattle **N. Chaiyabutr, P. Loypetjra, and A. Pichaicharnarong.** *Thai J. Vet. Med. (1984). 14(2) : 81.*

Ionic composition in erythrocytes were determined in 28 male swamp buffaloes and 17 male cattle. The ionic concentration in erythrocytes of swamp buffaloes were 19.2 ± 8.4 mEq/L red cell, 84.9 ± 8.0 mEq/L red cells, 69.8 ± 16.4 mEq/L red cell for sodium, potassium, and chloride ion, and 84.6 ± 9.9 gm/100 ml red cell, 3.90 ± 2.12 mg/100 ml red cell, and less than 0.1 mg/100 ml red cell for protein, inorganic phosphorus, and calcium respectively. Differences of sodium and potassium concentration in erythrocytes in comparison between

buffaloes and cattle were recorded. The concentration of sodium in erythrocytes of swamp buffalo were significantly less than in cattle 5 folds, whereas the concentration of potassium were significantly greater than cattle nearly 5 folds. These differences have been suggested to be under genetic control.

Measurements in glutathione peroxidase and Se^{75} uptake in red blood cells of cattle and buffaloes **N. Chaiyabutr, C. Buranakarl, S. Pondeenana, P. Loypetjra, and A. Pichaicharnarong** *Thai J. Vet. Med. (1984). 14(3) : 227.*

Measurements in glutathione peroxidase activity ($GSHP_x$) and erythrocytes uptake-Se^{75} in cattle and buffaloes were carried out. The percentage of erythrocytes uptake Se^{75} of blood cells from cattle were higher than those of buffaloes. For both species, the erythrocytes uptake Se^{75} values inversely correlated to the concentration levels of $GSHP_x$. The mean (± S:E.) values of $GSHP_x$ were 21.3 ± 1.7 units/ml. cells and 31.4 ± 2.4 units/ml. cells for cattle and buffaloes respectively.

Observations on general circulation and renal hemodynamics of experimental dogs given Russell's viper venom **N. Chaiyabutr, P. Tungthanathanich, P. Loypetjra, A. Pichaicharnarong, and V. Sitprija.** *Thai J. Vet. Med. (1984). 14(4) : 257.*

Intravenous administration of Russell's viper venom (0.1 mg/kg b.w.) resulted in marked changes in general circulation and renal hemodynamics in 7 anaesthetized male mongrel dogs. During initial postinjection period, mean arterial blood pressure, pulse pressure and heart rate showed to decrease significantly, thereafter it returned to the control level in a short period of 2 h after injection. Cardiac output decreased while packed cell volume significantly increased after venom injection. Renal plasma flow, renal blood flow, glomerular filtration rate, renal fraction and the rate of urine flow decreased over the period of 2 h after venom injection. Total peripheral resistance significantly increased as compared with the control. After venom injection, the renal fraction (% cardiac output) was reduced while the ratio of renal vascular resistance and total peripheral resistance was markedly increased. These findings suggest that an intrarenal mechanism seem to be responsible for the reduction of renal blood flow and filtration rate in the second hour after venom injection.

Urinary bladder effects after oral dosages of the antidiarrhoeal drug (Clioquinol/Phanquinone/Oxyphenonium bromide) in experimental dogs. **N. Chaiyabutr, T. Tesprateep, P. Loypetjra, and A. Pichaicharnarong,** *J. Med. Assoc. Thailand. (1985) : 86.*

A study was performed in six adult male mongrel dogs. Each animal was given the antidiarrheal drug containing a combination of 600 mg of clioquinol (iodochlorhydroxy quinolone), 60 mg of phanquinone and 6 mg of oxyphenonium bromide per day for three days. On the third day of drug administration all dogs showed sign of urinary frequency and haematuria. There were no significant changes in kidney function or cardiovascular function. The histopathological changes in kidney and urinary bladder were examined in all the six dogs. The cortex and medulla of the kidney showed signs of congestion. There were edematous swelling, ecchymosis and hematoma in the mucosa of urinary bladder. Sloughing of epithelial cells and muscular degeneration were also observed. These results might infer that the action of this conbination antidiarrheal drug was mainly in the urinary bladder.