

# **Physiological Data Reference Values for Tapir Species**

Edited by

**J. Andrew Teare, DVM**

**International Species Information System  
IUCN/SSC Tapir Specialist Group Veterinary Committee**

**2006**

## Note from ISIS

We are grateful for the clinical blood chemistry, haematology and body temperature data contributed by ISIS-member facilities that record and transmit this information using ISIS' MedARKS software. We encourage use of this pooled information, and invite the contribution of more information so that we may improve the next edition.

We are also grateful for grant and other support that has helped to develop ISIS' MedARKS software during the 1986-1998 period. Critical grant support was received from the U.S. Institute of Museum Services through the cooperation of the zoos of Seattle, Miami, Indianapolis, Atlanta, Minnesota, and Sedgwick County. Additional grant support was received from the Bronx Wildlife Conservation Park, Chicago-Brookfield Zoo, Louisville Zoo, Dallas Zoo, Los Angeles Zoo, the Zoological Society of Milwaukee, the American Association of Zoo Veterinarians and the Dutch Foundation for Research in Zoological Gardens. All this support is gratefully acknowledged.

Continued assistance and cooperation has been received over these many years from the American Association of Zoo Veterinarians and its Information Resources Committee. The dedicated professional efforts of J. Andrew Teare, DVM, and Cyd Shields Teare, MT made MedARKS and the underlying veterinary database possible.

**Nate Flesness**  
Executive Director, ISIS

## Note from TSG

On behalf of the Veterinary Committee of the IUCN Species Survival Commission Tapir Specialist Group (TSG) I we would like to express our gratitude to Ms. Laurie Bingaman Lackey from the International Species Information System (ISIS), who kindly supported our request to create this document and make it available for TSG members and other tapir conservationists. The information included on this document has been compiled from the ISIS Physiological Data Reference Values (2002 CD-ROM), edited by J. Andrew Teare, DVM.

Our main objective was to create a document including all the information about tapir normal physiological values and make it available to all professionals involved with tapir health investigation. The ISIS database is the most complete and extensive wildlife health information source.

Additionally, we would like to acknowledge all tapir holding zoological institutions around the world for constantly providing the information that feeds the ISIS information database.

We hope this document will contribute to the IUCN/SSC Tapir Specialist Group's efforts to conserve the four tapir species and their remaining habitat in South and Central America, and Southeast Asia.

**Javier Adolfo Sarria Perea DVM, M.Sc.**  
Coordinator, Veterinary Committee, IUCN/SSC Tapir Specialist Group (TSG)

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## Zoos holding Tapir as of July 2006

### Lowland tapir - *Tapirus terrestris*

Range: Colombia - South Brazil

Institution	Males	Females	Unknown	Births (Last 6 months)
Aalborg Zoo	1	1	0	0
Almaty Zoo	1	0	0	0
Parc Zoologique d'Amiens	2	1	0	1
Burger's Zoo En Safari	1	2	0	0
Monde Sauvage Safari SPRL	1	1	0	0
Curraghs Wildlife Park	2	1	0	1
Parc Zoologic de Barcelona	1	1	0	0
Howletts Wild Animal Park	1	2	0	0
Blackbrook Zoological Park	0	1	0	0
Blackpool Zoo	1	1	0	0
Espace Zoologique la Boissiere du Dore	0	1	0	0
Bristol Clifton West of England Zoological Society	1	2	0	1
Zoologicka Zahrada Mesta Brna	1	0	0	0
Paradise Wildlife Park	1	1	0	0
Budapest Zoological & Botanical Garden	1	0	0	0
Cotswold Wildlife Park	1	1	0	0
Parc Paradisio S.A. de Cambron-Casteau	1	1	0	0
Wildlife Park at Cricket St. Thomas	1	1	0	0
North of England Zoological Society	1	2	0	0
Parc Zoologique d'Amneville	1	1	0	0
Zoological Society of Ireland-Dublin	2	1	0	0
Dudley Zoological Gardens	2	1	0	1
Zoo Duisburg AG	1	1	0	0
Parken Zoo i Eskilstuna AB	1	1	0	0
Zoo de Doue-la-Fontaine	1	1	0	0
Fota Wildlife Park	1	0	0	0
Miejski Ogród Zoologiczny Wybrzeza	2	1	0	1
Tierpark Hagenbeck GmbH	2	3	0	1
Zoo Hannover GmbH	2	1	0	1
Herberstein Tier-und Naturpark	2	1	0	0
Amazon World	0	1	0	0
Kaliningrad Zoopark	2	1	0	0
Silesian Zoological Garden	3	2	0	0
GaiaPark	1	1	0	0
Kharkiv Zoo	1	0	0	0
Kolmardens Djurpark	1	1	0	0
Krakow Miejski Ogród Zoologiczny	1	1	0	0
Krefelder Zoo	1	1	0	0
Kristiansand Dyrepark ASA	1	1	0	0
Kyiv Zoo	1	1	0	0
Zoo de La Fleche	1	1	0	0
Zoobotanico de Jerez	1	3	0	1
Zoo de la Palmyre	0	1	0	0
Le PAL	1	2	0	0
Zoologicka Garden & Chateau Zlin-Lesna	1	0	0	0
Parc Zoologique de Lille	0	1	0	0
Linton Zoological Gardens	1	1	0	0
Zoo de Lisboa	2	2	0	1
Lisieux CERZA	1	3	0	1
Miejski Ogród Zoologiczny w Lodz	1	1	0	0
Zoo Aquarium Madrid (GRPR)	1	0	0	0
Parc de Lunaret Montpellier	1	0	0	0
Moscow Zoological Park	1	1	0	0
Newquay Zoo	0	1	0	0
Nikolaev Zoo	0	1	0	0
Nyiregyhazi Allatpark Kht. (Sosto Zoo)	1	0	0	0
Odense Zoologiske Have	2	1	0	1
Ogród Zoologiczny Opole	1	1	0	0
Zoo Osnabrück	1	3	0	0
Paignton Zoo Environmental Park Paignton	1	1	0	0
Safari de Peaugres	1	2	0	0
Plock Miejski Ogród Zoologiczny	1	0	0	0

Ogrod Zoologiczny W. Poznaniu	1	1	0	0
Zoological Garden Prague	1	1	0	0
Planete Sauvage	1	0	0	0
Parco Zoo Punta Verde	1	1	0	0
Zoological Center Tel Aviv – Ramat Gan	1	3	0	0
Randers Regnskov	1	1	0	0
Riga Zoo	2	3	0	1
Rome Zoo – Bioparco S.p.A.	3	2	0	0
Rostov-on-Don Zoo	3	2	0	0
South Lakes Wild Animal Park,	1	1	0	0
Leningrad Zoo – St. Petersburg	1	0	0	0
Szeged Zoo	1	1	0	1
Drayton Manor Park Zoo	1	1	0	0
Touroparc	1	2	0	0
Tropiquaria Wildlife Park	0	1	0	0
Twycross Zoo	2	2	0	0
Usti nad Labem Zoo	1	0	0	0
Miejski Ogrod Zool we Wroclawiu	2	2	0	0
Zagreb Zoo	0	0	3	0
Zoo Zürich	1	2	0	1
<b>Regional subtotal Europe</b>	<b>(93)</b>	<b>(94)</b>	<b>(3)</b>	<b>(14)</b>
Emerald Safari Resort	0	2	0	0
<b>Regional subtotal</b>	<b>(0)</b>	<b>(2)</b>	<b>(0)</b>	<b>(0)</b>
Alexandria Zoological Park	1	1	0	0
Audubon Nature Institute	2	2	0	0
BREC's Baton Rouge Zoo	1	0	0	0
Chicago Zoological Park	1	1	0	0
Dallas World Aquarium	1	1	0	0
Detroit Zoological Institute	1	1	0	0
The Houston Zoo	1	1	0	0
John Ball Zoological Garden	1	0	0	0
Peace River Refuge	8	7	0	1
San Antonio Zoological Gardens and Aquarium	1	0	0	0
Silver Springs Park	1	0	0	0
Palm Beach Zoo at Dreher Park	1	1	0	0
Wildlife World Zoo	1	1	0	0
<b>Regional subtotal North America</b>	<b>(21)</b>	<b>(16)</b>	<b>(0)</b>	<b>(1)</b>
Parque Zoologico "Benito Juarez"	1	0	0	0
Zoological Society of Trinidad & Tobago	0	1	0	0
<b>Regional subtotal Central America</b>	<b>(1)</b>	<b>(1)</b>	<b>(0)</b>	<b>(0)</b>
Fundacion Zoologica de Cali	3	1	0	0
Fundacion ParqueZoologia Sur de Maracaibo	3	1	0	1
Parque Zoologico Huachipa	0	1	0	0
Parque Zoological de Sao Paulo	2	2	0	0
Zoologico de Sorocaba	3	3	0	0
Parque de Animales Silvestres Temaikén	2	1	0	0
<b>Regional subtotal South America</b>	<b>(13)</b>	<b>(9)</b>	<b>(0)</b>	<b>(1)</b>
Ueno Zoological Gardens	1	1	0	0
Yokohama Zoological Gardens (ZOORASIA)	1	3	0	0
<b>Regional subtotal Asia</b>	<b>(2)</b>	<b>(4)</b>	<b>(0)</b>	<b>(0)</b>
Adelaide Zoo	0	3	0	0
Western Plains Zoo	3	1	0	1
Hamilton Zoo	1	1	0	0
Mogo Zoo P/L	1	2	0	0
<b>Regional subtotal Australia</b>	<b>(5)</b>	<b>(7)</b>	<b>(0)</b>	<b>(1)</b>
<b>Totals</b>	<b>135</b>	<b>133</b>	<b>3</b>	<b>17</b>

## Baird's tapir - *Tapirus bairdii*

Range: Southern Mexico-Ecuador

Institution	Males	Females	Unknown	Births (Last 6 months)
Zoologischer Garten Wuppertal	2	2	0	1
<b>Subtotal region Europe</b>	<b>(2)</b>	<b>(2)</b>	<b>(0)</b>	<b>(1)</b>
Brevard Zoo	1	1	0	0
Chicago Zoological Park	0	1	0	0
Palm Beach Zoo at Dreher Park	1	1	0	0
Franklin Park Zoo	1	1	0	0
Lee Richardson Zoo	1	0	0	0
Hattiesburg Zoo	2	0	0	0
Jacksonville Zoo and Gardens	1	0	0	0
Los Angeles Zoo & Botanical Gardens	1	0	0	0
Miami Metrozoo	3	1	0	1
Milwaukee County Zoological Gardens	1	2	0	0
Louisiana Purchase Gardens & Zoo	1	0	0	0
Callitrichid Research Center	1	0	0	0
Bergen County Zoological Park	1	1	0	0
San Francisco Zoological Gardens	1	0	0	0
Zoological Society of San Diego	1	1	0	0
Sedgwick County Zoo	2	1	0	0
Texas Zoo	1	0	0	0
White Oak Conservation Center	1	1	0	0
<b>Regional subtotal North America</b>	<b>(21)</b>	<b>(11)</b>	<b>(0)</b>	<b>(1)</b>
Guadalajara Zoo	1	0	0	0
Zoologico Nacional La Aurora	3	1	0	0
Zoologico Nacional Simon Bolivar	2	0	0	0
<b>Regional subtotal Central America</b>	<b>6</b>	<b>1</b>	<b>0</b>	<b>0</b>
Yokohama Zoological Gardens (ZOOASIA)	1	1	0	0
<b>Regional subtotal Asia</b>	<b>(1)</b>	<b>(1)</b>	<b>(0)</b>	<b>(0)</b>
<b>Totals</b>	<b>30</b>	<b>15</b>	<b>0</b>	<b>2</b>

## Malayan tapir - *Tapirus indicus*

Range: Burma - Sumatra

Institution	Males	Females	Unknown	Births (Last 6 months)
Artis Zoo	1	1	0	0
Zoo of Antwerp	1	2	0	0
Bekersbrne	1	0	0	0
City of Belfast Zoo	2	1	0	1
Copenhagen Zoo	1	1	0	0
Edinburgh Zoo-Scottish National Zoo	1	1	0	0
Rain Forest SL (Fuengirola Zoo)	1	2	0	0
Tiergarten Heidelberg	1	0	0	0
Zoologischer Garten Leipzig	1	1	0	0
Zoological Society of London	1	1	0	0
Port Lympne Wild Animal Park,	2	5	0	1
Zoo Aquarium Madrid (GRPR)	1	1	0	0
Munchener Tierpark Hellabrunn	1	2	0	0
Zoo Parc Overloon	1	0	0	0
Rotterdam Zoo	0	1	0	0
Wilhelma Zoo	1	0	0	0
Twycross Zoo	0	1	0	0
<b>Regional subtotal Europe</b>	<b>(17)</b>	<b>(20)</b>	<b>(0)</b>	<b>(2)</b>
National Zoological Gardens of South Africa	1	1	0	0
<b>Regional subtotal Africa</b>	<b>(1)</b>	<b>(1)</b>	<b>(0)</b>	<b>(0)</b>
Cleveland Metroparks Zoo	1	1	0	0
Denver Zoological Gardens	0	1	0	0
Disney's Animal Kingdom	0	1	0	0
El Paso Zoo	1	1	0	0
Chaffee Zoological Gardens of Fresno	1	1	0	0
Jackson Zoological Park	1	1	0	0
Mountain View Conservation and Breeding Center	2	2	0	1
Louisville Zoological Garden	1	1	0	0
Lowry Park Zoological Garden	1	3	0	1

Ellen Trout Zoo	1	0	0	0
Henry Vilas Zoo	1	1	0	0
Miami Metrozoo	1	1	0	0
Minnesota Zoological Garden	1	2	0	0
The Wildlife Conservation Society	1	2	0	0
Callitrichid Research Center	0	2	0	0
Peace River Refuge	3	4	0	1
Zoological Society of San Diego	1	2	0	1
Woodland Park Zoological Gardens	1	1	0	0
Sedgwick County Zoo	0	1	0	0
Point Defiance Zoo & Aquarium	1	1	0	0
Toronto zoo	1	0	0	0
Wildlife Safari Inc	1	0	0	0
<b>Regional subtotal North America</b>	<b>(21)</b>	<b>(29)</b>	<b>(0)</b>	<b>(4)</b>
Khao Kheow Open Zoo	3	5	1	0
Zoo Negara Malaysia	2	3	0	0
Zoo Melaka	3	4	0	1
South-North Trading Inc	2	0	0	0
Singapore Zoological Gardens	2	6	0	0
Taiping Zoo	4	6	2	0
Tama Zoological Park	2	2	0	0
Yokohama Zoological Gardens (ZOORASIA)	3	5	0	1
<b>Regional subtotal Asia</b>	<b>(21)</b>	<b>(31)</b>	<b>(3)</b>	<b>(2)</b>
Adelaide Zoo	1	2	0	0
Melbourne Museum	0	1	0	0
Taronga Zoo,	1	1	0	0
<b>Regional subtotal Australia</b>	<b>(2)</b>	<b>(4)</b>	<b>(0)</b>	<b>(0)</b>
<b>Totals</b>	<b>62</b>	<b>85</b>	<b>3</b>	<b>8</b>

## Mountain/Woolly tapir - *Tapirus pinchaque*

Range: Colombia – Ecuador

Institution	Males	Females	Unknown	Births (Last 6 months)
Cheyenne Mountain Zoological Park	1	1	0	0
Mountain View Conservation and Breeding Center	1	1	0	0
Los Angeles Zoo & Botanical Gardens	2	1	1	0
San Francisco Zoological Gardens	1	1	0	0
<b>Regional Subtotal North America</b>	<b>(5)</b>	<b>(4)</b>	<b>(1)</b>	<b>(0)</b>
<b>Totals</b>	<b>5</b>	<b>4</b>	<b>1</b>	<b>0</b>

# International Species Information System Physiological Data Reference Values - 2002

Edited by J. Andrew Teare, DVM

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## Disclaimer:

At ISIS we take reasonable precautions to ensure that the reference ranges provided on this disk are of the highest possible quality. We remove extreme outlying values and quality-check the information submitted in several ways. However, as it is not possible to individually review all the test results contained in the more than 135,000 blood sample records submitted by member institutions, the pooled data is technically provided to you on an *AS IS* basis. Some unlikely test values may have inadvertently been included in the calculations, leading to reference ranges for individual tests that experienced clinicians will recognize as implausible. However, we are confident that the vast majority of reference values provided on this disk will provide useful diagnostic assistance for interpretation of test results obtained at your institution.

## The ISIS Physiological Values database:

Test results for blood samples, along with associated body temperature and weight information, have been submitted to the ISIS database by member institutions for more than 20 years. Originally, paper forms were used to submit results to the database. Starting in 1992, member institutions, using the MedARKS software to manage their medical records, gained the ability to submit records electronically and the paper submission system was discontinued. The database has grown by about 5000 records annually since the switch to electronic submissions and participation by member institutions continues to grow. The total database currently contains over 135,000 sample records, obtained from more than 1100 species and provides a unique collection of physiological information for analysis.

## Organization of the reference pages:

A reference values page starts with a header section that identifies the species, the age and sex groups used for the calculations, and the type of units, followed by a table that contains the calculated reference ranges. Each row in the table contains the name of the test, the mean and standard deviation of sample results, the minimum and maximum values in the data set used to calculate the mean, the number of samples used to calculate the mean and, finally, the number of individual animals that were sampled.

For physiological data pages, hematology tests are at the top of the table, followed by blood chemistry tests and body temperature at the bottom of the table. The number of rows in this table varies greatly between species and this is entirely a reflection of the information submitted to the ISIS database by member institutions. In general, there is an inverse relationship between average body size for a species and the number of tests on a reference page for that species (smaller animals yield smaller samples, which allow for fewer tests).

Weight tables provide reference values for a number of age categories. As with the physiological data tables, the number of rows (age groupings) in a weight table is entirely a reflection of the information submitted to the ISIS database by member institutions. When a sufficient number of records are available for a variety of ages, the resulting page of body weight reference values can be used to construct a rough growth curve for the species.

## How the reference ranges are calculated:

There are several potential problems associated with calculating physiological reference ranges from a database assembled from multiple sources. Our member institutions use different methods to collect and handle the blood samples and different laboratories are used to process the samples. Generating the reference values includes a number of steps that are designed to minimize the impact of these potential problems.

First, ISIS provides feedback on submitted results to the member institutions. All records submitted to ISIS are automatically scanned for unusual values and a report to the submitting institution provides the institution with the opportunity to review any unusual values that were detected. When records are edited by the institution, the new values are used to update the ISIS database. To minimize the impact of an outlying value, inclusion in this publication requires that a species have at least 10 sample records in the ISIS database. To maximize the number of available records for a species, all subspecies designations are ignored for the purpose of calculating the reference ranges. Only samples from animals that are classified, by the submitting institution, as being in normal health are used in calculating reference ranges.

During the calculation of reference ranges, all entries in the ISIS database are further processed in a number of ways in an attempt to eliminate values that represent laboratory or data entry errors. Finally, reference ranges are calculated in a 2-step process from the results that have passed all the previous tests. In the first step, an initial mean and standard deviation are calculated. In the second processing step, results in the sample set that deviate from the initial mean by more than 3 standard deviations are discarded and a final set of reference values are calculated from the remaining test values. This final processing step is designed to help eliminate outlying values that usually represent data errors.

## Reference ranges for sex and age groups:

A large number of factors, beyond simply the health status of the animal, can influence test results obtained from an animal. In recognition of that fact, ISIS has begun to calculate for some species, reference values from various subsets of the available information. At the recommendation of the Information Resources Committee of the American Association of Zoo Veterinarians, the first subdivisions of the information have been along the lines of sex and age. Raymund F. Wack, DVM, who chaired that committee at the time, was instrumental in establishing many of the species age grouping used in this publication and we greatly appreciate his efforts.

When a species has at least 100 records in the ISIS database, in addition to the overall reference values calculated from all the sample results, separate pages of reference pages are calculated for various sex and age groups. The age divisions vary for different species, and are selected with the intention of dividing the samples into the broad age groups of neonatal, infant/juvenile, adult and aged animals. When dividing samples by sex, only samples obtained from known males or known females are included in the calculations. Separate pages are produced for each combination of age and sex divisions, a process that can produce as many as 15 pages of reference values for a single species. Clearly, a species must have a large number of samples in the database to produce a subset reference page with a significant number of samples. Currently, any subset reference page with results is included in this publication but the value of pages calculated from a small set of sample results will need to be judged by the person using this reference.

It is hoped that future editions will be able to provide reference values for other subsets of the available information, such as for samples collected with chemical restraint versus manual restraint, or animal fasting time and animal activity prior to sample collection.

*International Species Information System*  
Eagan, MN 55121 U.S.A.  
<http://www.isis.org/>



**International Species Information System**  
**Physiological Data Reference Values - 2002**

*edited by J. Andrew Teare, DVM*

**Table of Conversion Factors**

Test	U.S.A. Units	x	Factor	=	International Units
WHITE BLOOD CELL COUNT	*10 <sup>3</sup> /μl	x	1	=	*10 <sup>9</sup> /L
RED BLOOD CELL COUNT	*10 <sup>6</sup> /μl	x	1	=	*10 <sup>12</sup> /L
HEMOGLOBIN	g/dl	x	10	=	g/L
HEMATOCRIT	%	x	.01	=	L/L
MCV	fL	x	1.0	=	fL
MCH	pg/cell	x	1.0	=	pg/cell
MCHC	g/dl	x	10	=	g/L
PLATELET COUNT	*10 <sup>3</sup> /μl	x	0.001	=	*10 <sup>12</sup> /L
NUCLEATED RED BLOOD CELLS	/100 WBC	x	1	=	/100 WBC
RETICULOCYTES	%	x	1	=	%
SEGMENTED NEUTROPHILS	*10 <sup>3</sup> /μl	x	1	=	*10 <sup>9</sup> /L
HETEROPHILS	*10 <sup>3</sup> /μl	x	1	=	*10 <sup>9</sup> /L
LYMPHOCYTES	*10 <sup>3</sup> /μl	x	1	=	*10 <sup>9</sup> /L
MONOCYTES	*10 <sup>3</sup> /μl	x	1	=	*10 <sup>9</sup> /L
EOSINOPHILS	*10 <sup>3</sup> /μl	x	1	=	*10 <sup>9</sup> /L
BASOPHILS	*10 <sup>3</sup> /μl	x	1	=	*10 <sup>9</sup> /L
AZUROPHILS	*10 <sup>3</sup> /μl	x	1	=	*10 <sup>9</sup> /L
NEUTROPHILIC BANDS	*10 <sup>3</sup> /μl	x	1	=	*10 <sup>9</sup> /L
CALCIUM	mg/dl	x	0.25	=	mMol/L
PHOSPHORUS	mg/dl	x	0.323	=	mMol/L
SODIUM	mEq/L	x	1	=	mMol/L
POTASSIUM	mEq/L	x	1	=	mMol/L
CHLORIDE	mEq/L	x	1	=	mMol/L
BICARBONATE	mEq/L	x	1	=	mMol/L
CARBON DIOXIDE	mEq/L	x	1	=	mMol/L
OSMOLARITY	mOsmol/L	x	.001	=	Osmol/L
IRON	μg/dl	x	0.179	=	μMol/L
MAGNESIUM	mg/dl	x	.4114	=	mMol/L
BLOOD UREA NITROGEN	mg/dl	x	0.357	=	mMol/L
CREATININE	mg/dl	x	88.4	=	μMol/L
URIC ACID	mg/dl	x	.0595	=	mMol/L
TOTAL BILIRUBIN	mg/dl	x	17.1	=	μMol/L
DIRECT BILIRUBIN	mg/dl	x	17.1	=	μMol/L
INDIRECT BILIRUBIN	mg/dl	x	17.1	=	μMol/L
GLUCOSE	mg/dl	x	.0555	=	mMol/L
CHOLESTEROL	mg/dl	x	.0259	=	mMol/L
TRIGLYCERIDE	mg/dl	x	.0113	=	mMol/L
LOW DENSITY LIPOPROTEIN CHOLESTEROL	mg/dl	x	.0259	=	mMol/L
HIGH DENSITY LIPOPROTEIN CHOLESTEROL	mg/dl	x	.0259	=	mMol/L
CREATINE PHOSPHOKINASE	IU/L	x	1	=	U/L
LACTATE DEHYDROGENASE	IU/L	x	1	=	U/L
ALKALINE PHOSPHATASE	IU/L	x	1	=	U/L
ALANINE AMINOTRANSFERASE	IU/L	x	1	=	U/L
ASPARTATE AMINOTRANSFERASE	IU/L	x	1	=	U/L
GAMMA GLUTAMYLTRANSFERASE	IU/L	x	1	=	U/L
AMYLASE	U/L	x	.185	=	U/L
LIPASE	U/L	x	.278	=	U/L
TOTAL PROTEIN (COLORIMETRY)	g/dl	x	10	=	g/L
GLOBULIN (COLORIMETRY)	g/dl	x	10	=	g/L
ALBUMIN (COLORIMETRY)	g/dl	x	10	=	g/L
FIBRINOGEN	mg/dl	x	.01	=	g/L
GAMMA GLOBULIN (ELECTROPHORESIS)	g/dl	x	10	=	g/L
ALBUMIN (ELECTROPHORESIS)	g/dl	x	10	=	g/L
ALPHA GLOBULIN (ELECTROPHORESIS)	mg/dl	x	0.01	=	g/L
ALPHA-1 GLOBULIN (ELECTROPHORESIS)	mg/dl	x	0.01	=	g/L

ALPHA-2 GLOBULIN (ELECTROPHORESIS)	mg/dl	x	0.01	=	g/L
BETA GLOBULIN (ELECTROPHORESIS)	mg/dl	x	0.01	=	g/L
CORTISOL	&micro;g/dl	x	27.59	=	nMol/L
TESTOSTERONE	ng/ml	x	3.47	=	nMol/L
PROGESTERONE	ng/dl	x	.0318	=	nMol/L
ESTROGEN	pg/ml	x	3.47	=	nMol/L
TOTAL TRIIODOTHYRONINE	ng/ml	x	.0154	=	nMol/L
TOTAL THYROXINE	&micro;g/dl	x	12.9	=	nMol/L
TRIIODOTHYRONINE UPTAKE	%	x	1	=	%
FREE TRIIODOTHYRONINE	pg/ml	x	15.4	=	nMol/L
RETINOL	&micro;g/dl	x	.0349	=	&micro;Mol/L
TOCOPHEROL	&micro;g/ml	x	.0232	=	nMol/L
TOCOPHEROL, ALPHA	&micro;g/dl	x	2.32	=	nMol/L
TOCOPHEROL, GAMMA	&micro;g/dl	x	2.32	=	nMol/L
LEAD	&micro;g/dl	x	.0483	=	&micro;Mol/L

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*International Species Information System*  
 Eagan, MN 55121 U.S.A.  
<http://www.isis.org/>

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**Normal Physiological Values  
for Lowland Tapir  
*Tapirus Terrestris***

**International Species Information System  
2002**

## Physiological reference ranges calculated for males only, ages: < 8 Days

Sample results submitted by 2 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	7.170	0.000	7.170	7.170	1	1
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	7.25	0.00	7.25	7.25	1	1
HEMOGLOBIN	g/L	118	0	118	118	1	1
HEMATOCRIT	L/L	0.310	0.000	0.310	0.310	1	1
MCV	fL	42.8	0.0	42.8	42.8	1	1
MCH	pg/cell	16.3	0.0	16.3	16.3	1	1
MCHC	g/L	381	0	381	381	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	5.460	0.000	5.460	5.460	1	1
LYMPHOCYTES	*10 <sup>9</sup> /L	1.150	0.000	1.150	1.150	1	1
MONOCYTES	*10 <sup>9</sup> /L	0.287	0.000	0.287	0.287	1	1
EOSINOPHILS	*10 <sup>9</sup> /L	0.287	0.000	0.287	0.287	1	1
CALCIUM	mMol/L	3.08	0.00	3.08	3.08	1	1
BLOOD UREA NITROGEN	mMol/L	6.783	.0000	6.783	6.783	1	1
CREATININE	μMol/L	44	0	44	44	1	1
URIC ACID	mMol/L	0.065	0.000	0.065	0.065	1	1
TOTAL BILIRUBIN	μMol/L	15	0	15	15	1	1
GLUCOSE	mMol/L	7.604	.2220	7.437	7.715	2	2
CHOLESTEROL	mMol/L	4.558	.0000	4.558	4.558	1	1
TRIGLYCERIDE	mMol/L	.8362	.0000	.8362	.8362	1	1
ALANINE AMINOTRANSFERASE	U/L	33	0	33	33	1	1
ASPARTATE AMINOTRANSFERASE	U/L	204	0	204	204	1	1
GAMMA GLUTAMYLTRANSFERASE	U/L	254	0	254	254	1	1
TOTAL PROTEIN (COLORIMETRY)	g/L	61	0	61	61	1	1

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for females only, ages: < 8 Days**

Sample results submitted by 5 member institutions.

<b>Test</b>	<b>Units</b>	<b>Mean</b>	<b>St. Dev.</b>	<b>Minimum Value</b>	<b>Maximum Value</b>	<b>Sample Size<sup>a</sup></b>	<b>Animals<sup>b</sup></b>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	9.640	4.306	2.400	13.80	5	5
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	7.18	0.89	5.70	7.99	5	5
HEMOGLOBIN	g/L	95	16	73	111	4	4
HEMATOCRIT	L/L	0.284	0.051	0.210	0.348	5	5
MCV	fL	39.4	4.5	33.8	45.1	5	5
MCH	pg/cell	13.6	0.8	12.8	14.4	4	4
MCHC	g/L	334	26	306	364	4	4
PLATELET COUNT	*10 <sup>12</sup> /L	.2170	.0000	.2170	.2170	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	6.886	4.172	0.768	12.10	5	5
LYMPHOCYTES	*10 <sup>9</sup> /L	2.228	1.171	1.380	4.140	5	5
MONOCYTES	*10 <sup>9</sup> /L	0.108	0.027	0.072	0.138	4	4
EOSINOPHILS	*10 <sup>9</sup> /L	0.096	0.050	0.024	0.138	4	4
BASOPHILS	*10 <sup>9</sup> /L	0.094	0.030	0.072	0.115	2	2
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	1.580	0.000	1.580	1.580	1	1
CALCIUM	mMol/L	2.83	0.23	2.53	3.00	4	4
PHOSPHORUS	mMol/L	1.62	0.36	1.42	2.16	4	4
SODIUM	mMol/L	138	8	131	148	4	4
POTASSIUM	mMol/L	4.4	0.6	3.7	5.1	4	4
CHLORIDE	mMol/L	97	7	90	106	4	4
CARBON DIOXIDE	mMol/L	25.0	4.2	22.0	28.0	2	2
BLOOD UREA NITROGEN	mMol/L	5.712	4.641	1.785	12.14	4	4
CREATININE	µMol/L	80	18	53	97	4	4
TOTAL BILIRUBIN	µMol/L	19	5	12	26	4	4
DIRECT BILIRUBIN	µMol/L	3	2	2	3	2	2
INDIRECT BILIRUBIN	µMol/L	15	3	12	17	2	2
GLUCOSE	mMol/L	7.604	.8325	6.827	8.436	4	4
CHOLESTEROL	mMol/L	3.626	1.554	2.486	5.387	3	3
CREATINE PHOSPHOKINASE	U/L	272	207	125	418	2	2
ALKALINE PHOSPHATASE	U/L	1085	419	725	1640	4	4
ALANINE AMINOTRANSFERASE	U/L	9	2	8	11	3	3
ASPARTATE AMINOTRANSFERASE	U/L	110	24	95	145	4	4
GAMMA GLUTAMYLTRANSFERASE	U/L	143	0	143	143	1	1
AMYLASE	U/L	101.2	.0000	101.2	101.2	1	1
TOTAL PROTEIN (COLORIMETRY)	g/L	67	6	60	73	4	4
GLOBULIN (COLORIMETRY)	g/L	48	10	36	54	3	3
ALBUMIN (COLORIMETRY)	g/L	20	3	18	24	3	3
FIBRINOGEN	g/L	2.500	.7100	2.000	3.000	2	2

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for both sexes combined, ages: < 8 Days**

Sample results submitted by 5 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	9.228	3.981	2.400	13.80	6	6
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	7.19	0.79	5.70	7.99	6	6
HEMOGLOBIN	g/L	100	17	73	118	5	5
HEMATOCRIT	L/L	0.288	0.047	0.210	0.348	6	6
MCV	fL	40.0	4.3	33.8	45.1	6	6
MCH	pg/cell	14.1	1.4	12.8	16.3	5	5
MCHC	g/L	344	31	306	381	5	5
PLATELET COUNT	*10 <sup>12</sup> /L	.2170	.0000	.2170	.2170	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	6.648	3.776	0.768	12.10	6	6
LYMPHOCYTES	*10 <sup>9</sup> /L	2.048	1.136	1.150	4.140	6	6
MONOCYTES	*10 <sup>9</sup> /L	0.144	0.084	0.072	0.287	5	5
EOSINOPHILS	*10 <sup>9</sup> /L	0.134	0.096	0.024	0.287	5	5
BASOPHILS	*10 <sup>9</sup> /L	0.094	0.030	0.072	0.115	2	2
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	1.580	0.000	1.580	1.580	1	1
CALCIUM	mMol/L	2.88	0.23	2.53	3.08	5	5
PHOSPHORUS	mMol/L	1.62	0.36	1.42	2.16	4	4
SODIUM	mMol/L	138	8	131	148	4	4
POTASSIUM	mMol/L	4.4	0.6	3.7	5.1	4	4
CHLORIDE	mMol/L	97	7	90	106	4	4
CARBON DIOXIDE	mMol/L	25.0	4.2	22.0	28.0	2	2
BLOOD UREA NITROGEN	mMol/L	5.712	3.927	1.785	12.14	5	5
CREATININE	μMol/L	71	18	44	97	5	5
URIC ACID	mMol/L	0.065	0.000	0.065	0.065	1	1
TOTAL BILIRUBIN	μMol/L	17	5	12	26	5	5
DIRECT BILIRUBIN	μMol/L	3	2	2	3	2	2
INDIRECT BILIRUBIN	μMol/L	15	3	12	17	2	2
GLUCOSE	mMol/L	7.604	.6660	6.827	8.436	6	6
CHOLESTEROL	mMol/L	3.859	1.347	2.486	5.387	4	4
TRIGLYCERIDE	mMol/L	.8362	.0000	.8362	.8362	1	1
CREATINE PHOSPHOKINASE	U/L	272	207	125	418	2	2
ALKALINE PHOSPHATASE	U/L	1085	419	725	1640	4	4
ALANINE AMINOTRANSFERASE	U/L	15	12	8	33	4	4
ASPARTATE AMINOTRANSFERASE	U/L	128	47	95	204	5	5
GAMMA GLUTAMYLTRANSFERASE	U/L	199	78	143	254	2	2
AMYLASE	U/L	101.2	.0000	101.2	101.2	1	1
TOTAL PROTEIN (COLORIMETRY)	g/L	65	6	60	73	5	5
GLOBULIN (COLORIMETRY)	g/L	48	10	36	54	3	3
ALBUMIN (COLORIMETRY)	g/L	20	3	18	24	3	3
FIBRINOGEN	g/L	2.500	.7100	2.000	3.000	2	2

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for males only, ages: 8 days – 2 years**

Sample results submitted by 3 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	13.48	6.954	7.200	20.50	4	3
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	7.72	0.16	7.54	7.85	3	2
HEMOGLOBIN	g/L	110	15	101	127	3	2
HEMATOCRIT	L/L	0.378	0.097	0.290	0.464	4	3
MCV	fL	45.3	11.9	38.4	59.1	3	2
MCH	pg/cell	14.2	1.7	13.1	16.2	3	2
MCHC	g/L	321	41	274	348	3	2
PLATELET COUNT	*10 <sup>12</sup> /L	.3450	.0000	.3450	.3450	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	7.135	5.180	2.740	13.90	4	3
LYMPHOCYTES	*10 <sup>9</sup> /L	5.085	1.885	3.590	7.730	4	3
MONOCYTES	*10 <sup>9</sup> /L	0.369	0.228	0.072	0.625	4	3
EOSINOPHILS	*10 <sup>9</sup> /L	0.830	0.726	0.156	1.840	4	3
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.205	0.000	0.205	0.205	1	1
CALCIUM	mMol/L	2.65	0.28	2.33	2.88	3	2
PHOSPHORUS	mMol/L	2.33	0.29	2.07	2.62	3	2
SODIUM	mMol/L	135	3	132	137	3	2
POTASSIUM	mMol/L	3.6	0.6	3.1	4.2	3	2
CHLORIDE	mMol/L	96	2	94	98	3	2
CARBON DIOXIDE	mMol/L	26.7	3.5	23.0	30.0	3	2
MAGNESIUM	mMol/L	0.741	0.173	0.617	0.864	2	1
BLOOD UREA NITROGEN	mMol/L	1.428	.7140	1.071	2.142	3	2
CREATININE	µMol/L	88	9	80	97	3	2
URIC ACID	mMol/L	0.012	0.000	0.012	0.012	2	1
TOTAL BILIRUBIN	µMol/L	10	5	7	15	3	2
DIRECT BILIRUBIN	µMol/L	2	0	2	2	1	1
INDIRECT BILIRUBIN	µMol/L	14	0	14	14	1	1
GLUCOSE	mMol/L	6.105	1.277	5.273	7.548	3	2
CHOLESTEROL	mMol/L	2.745	.7511	2.150	3.574	3	2
TRIGLYCERIDE	mMol/L	.3955	.0339	.3729	.4181	2	1
CREATINE PHOSPHOKINASE	U/L	130	110	55	256	3	2
LACTATE DEHYDROGENASE	U/L	393	123	306	480	2	1
ALKALINE PHOSPHATASE	U/L	61	25	46	90	3	2
ALANINE AMINOTRANSFERASE	U/L	15	6	8	20	3	2
ASPARTATE AMINOTRANSFERASE	U/L	68	10	59	79	3	2
GAMMA GLUTAMYLTRANSFERASE	U/L	16	6	9	20	3	2
AMYLASE	U/L	701.2	.0000	701.2	701.2	1	1
TOTAL PROTEIN (COLORIMETRY)	g/L	70	11	58	79	3	2
GLOBULIN (COLORIMETRY)	g/L	40	18	19	53	3	2
ALBUMIN (COLORIMETRY)	g/L	30	8	26	39	3	2

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.



**Physiological reference ranges calculated for females only, ages: 8 days – 2 years**

Sample results submitted by 4 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	9.844	2.070	7.200	12.40	9	6
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	9.72	1.42	7.90	11.60	8	5
HEMOGLOBIN	g/L	143	9	134	162	7	5
HEMATOCRIT	L/L	0.411	0.034	0.355	0.478	8	6
MCV	fL	43.9	6.9	30.9	52.4	7	5
MCH	pg/cell	15.3	1.9	12.0	18.1	7	5
MCHC	g/L	351	18	335	389	7	5
PLATELET COUNT	*10 <sup>12</sup> /L	.2670	.0000	.2670	.2670	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	4.675	1.254	3.200	6.110	8	6
LYMPHOCYTES	*10 <sup>9</sup> /L	4.346	1.247	3.060	6.200	8	6
MONOCYTES	*10 <sup>9</sup> /L	0.221	0.131	0.072	0.390	7	6
EOSINOPHILS	*10 <sup>9</sup> /L	0.453	0.322	0.242	1.080	6	5
BASOPHILS	*10 <sup>9</sup> /L	0.084	0.009	0.077	0.090	2	1
CALCIUM	mMol/L	2.63	0.23	2.35	2.98	7	6
PHOSPHORUS	mMol/L	2.42	0.48	2.00	3.29	6	5
SODIUM	mMol/L	135	2	132	137	6	5
POTASSIUM	mMol/L	3.6	0.4	3.3	4.3	6	5
CHLORIDE	mMol/L	98	4	92	103	6	5
BICARBONATE	mMol/L	22.0	0.0	22.0	22.0	1	1
CARBON DIOXIDE	mMol/L	23.0	0.0	23.0	23.0	1	1
IRON	μMol/L	25.06	10.56	16.47	38.84	4	3
BLOOD UREA NITROGEN	mMol/L	3.213	1.071	1.785	4.641	7	6
CREATININE	μMol/L	106	27	44	133	7	6
URIC ACID	mMol/L	0.012	0.006	0.006	0.012	4	3
TOTAL BILIRUBIN	μMol/L	12	5	3	17	7	6
DIRECT BILIRUBIN	μMol/L	5	3	0	9	7	6
INDIRECT BILIRUBIN	μMol/L	7	2	3	9	7	6
GLUCOSE	mMol/L	6.605	1.887	4.274	9.380	7	6
CHOLESTEROL	mMol/L	5.387	1.191	3.626	6.786	6	5
TRIGLYCERIDE	mMol/L	.4407	.1808	.1808	.5763	4	3
CREATINE PHOSPHOKINASE	U/L	134	71	59	201	3	3
LACTATE DEHYDROGENASE	U/L	485	28	462	532	5	4
ALKALINE PHOSPHATASE	U/L	53	33	2	101	7	6
ALANINE AMINOTRANSFERASE	U/L	8	4	5	14	6	5
ASPARTATE AMINOTRANSFERASE	U/L	71	16	55	101	7	6
GAMMA GLUTAMYLTRANSFERASE	U/L	8	5	4	13	3	3
AMYLASE	U/L	574.8	.0000	574.8	574.8	1	1
TOTAL PROTEIN (COLORIMETRY)	g/L	64	6	55	71	6	5
GLOBULIN (COLORIMETRY)	g/L	31	7	24	41	6	5
ALBUMIN (COLORIMETRY)	g/L	33	5	30	42	6	5
FIBRINOGEN	g/L	3.000	.0000	3.000	3.000	1	1
Body Temperature:	°C	36.5	0.6	36.0	37.0	4	3

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated both sexes combined, ages: 8 days – 2 years**

Sample results submitted by 6 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	10.96	4.242	7.200	20.50	13	9
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	9.17	1.51	7.54	11.60	11	7
HEMOGLOBIN	g/L	133	19	101	162	10	7
HEMATOCRIT	L/L	0.400	0.060	0.290	0.478	12	9
MCV	fL	44.3	8.0	30.9	59.1	10	7
MCH	pg/cell	15.0	1.8	12.0	18.1	10	7
MCHC	g/L	342	28	274	389	10	7
PLATELET COUNT	*10 <sup>12</sup> /L	.3060	.0550	.2670	.3450	2	2
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	5.495	3.128	2.740	13.90	12	9
LYMPHOCYTES	*10 <sup>9</sup> /L	4.593	1.446	3.060	7.730	12	9
MONOCYTES	*10 <sup>9</sup> /L	0.275	0.177	0.072	0.625	11	9
EOSINOPHILS	*10 <sup>9</sup> /L	0.604	0.521	0.156	1.840	10	8
BASOPHILS	*10 <sup>9</sup> /L	0.084	0.009	0.077	0.090	2	1
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.205	0.000	0.205	0.205	1	1
CALCIUM	mMol/L	2.63	0.23	2.33	2.98	10	8
PHOSPHORUS	mMol/L	2.39	0.39	2.00	3.29	9	7
SODIUM	mMol/L	135	2	132	137	9	7
POTASSIUM	mMol/L	3.6	0.4	3.1	4.3	9	7
CHLORIDE	mMol/L	97	4	92	103	9	7
BICARBONATE	mMol/L	22.0	0.0	22.0	22.0	1	1
CARBON DIOXIDE	mMol/L	25.8	3.4	23.0	30.0	4	3
IRON	µMol/L	25.06	10.56	16.47	38.84	4	3
MAGNESIUM	mMol/L	0.741	0.173	0.617	0.864	2	1
BLOOD UREA NITROGEN	mMol/L	2.856	1.071	1.071	4.641	10	8
CREATININE	µMol/L	97	27	44	133	10	8
URIC ACID	mMol/L	0.012	0.000	0.006	0.012	6	4
TOTAL BILIRUBIN	µMol/L	12	5	3	17	10	8
DIRECT BILIRUBIN	µMol/L	5	3	0	9	8	7
INDIRECT BILIRUBIN	µMol/L	9	3	3	14	8	7
GLUCOSE	mMol/L	6.438	1.665	4.274	9.380	10	8
CHOLESTEROL	mMol/L	4.507	1.684	2.150	6.786	9	7
TRIGLYCERIDE	mMol/L	.4294	.1469	.1808	.5763	6	4
CREATINE PHOSPHOKINASE	U/L	132	83	55	256	6	5
LACTATE DEHYDROGENASE	U/L	459	71	306	532	7	5
ALKALINE PHOSPHATASE	U/L	55	29	2	101	10	8
ALANINE AMINOTRANSFERASE	U/L	10	5	5	20	9	7
ASPARTATE AMINOTRANSFERASE	U/L	70	14	55	101	10	8
GAMMA GLUTAMYLTRANSFERASE	U/L	12	7	4	20	6	5
AMYLASE	U/L	638.1	89.36	574.8	701.2	2	2
TOTAL PROTEIN (COLORIMETRY)	g/L	66	8	55	79	9	7
GLOBULIN (COLORIMETRY)	g/L	34	12	19	53	9	7
ALBUMIN (COLORIMETRY)	g/L	32	5	26	42	9	7
FIBRINOGEN	g/L	3.000	.0000	3.000	3.000	1	1
Body Temperature:	°C	36.5	0.6	36.0	37.0	4	3

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for males only, ages: 2 – 20 years**

Sample results submitted by 11 member institutions.

<b>Test</b>	<b>Units</b>	<b>Mean</b>	<b>St. Dev.</b>	<b>Minimum Value</b>	<b>Maximum Value</b>	<b>Sample Size<sup>a</sup></b>	<b>Animals<sup>b</sup></b>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	8.441	2.115	4.600	13.90	29	16
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	8.79	1.74	6.24	12.80	25	12
HEMOGLOBIN	g/L	149	19	113	179	25	12
HEMATOCRIT	L/L	0.431	0.039	0.344	0.531	29	16
MCV	fL	50.1	7.3	39.3	68.3	25	12
MCH	pg/cell	17.2	2.0	13.9	20.7	24	11
MCHC	g/L	344	24	265	379	25	12
PLATELET COUNT	*10 <sup>12</sup> /L	.2140	.0480	.1340	.2950	7	6
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	4.664	1.400	2.050	7.810	27	15
LYMPHOCYTES	*10 <sup>9</sup> /L	2.949	1.220	0.558	5.700	28	15
MONOCYTES	*10 <sup>9</sup> /L	0.236	0.141	0.084	0.556	21	13
EOSINOPHILS	*10 <sup>9</sup> /L	0.538	0.353	0.055	1.440	27	15
BASOPHILS	*10 <sup>9</sup> /L	0.080	0.035	0.055	0.104	2	1
CALCIUM	mMol/L	2.63	0.20	2.33	3.00	26	13
PHOSPHORUS	mMol/L	1.78	0.32	1.20	2.52	23	10
SODIUM	mMol/L	138	4	126	145	24	11
POTASSIUM	mMol/L	3.5	0.5	2.9	4.6	24	11
CHLORIDE	mMol/L	100	3	93	106	24	11
CARBON DIOXIDE	mMol/L	29.1	1.3	28.0	30.9	4	4
IRON	µMol/L	20.23	5.549	14.86	33.83	11	3
BLOOD UREA NITROGEN	mMol/L	3.213	.7140	2.142	4.641	27	14
CREATININE	µMol/L	115	27	71	177	22	12
URIC ACID	mMol/L	0.012	0.012	0.000	0.042	13	4
TOTAL BILIRUBIN	µMol/L	10	7	2	27	27	14
DIRECT BILIRUBIN	µMol/L	5	3	0	14	14	5
INDIRECT BILIRUBIN	µMol/L	9	7	2	26	14	5
GLUCOSE	mMol/L	5.495	1.277	3.386	9.047	27	14
CHOLESTEROL	mMol/L	6.708	2.383	3.160	10.15	24	11
TRIGLYCERIDE	mMol/L	.3842	.1582	.1808	.7119	22	10
CREATINE PHOSPHOKINASE	U/L	142	41	95	168	3	3
LACTATE DEHYDROGENASE	U/L	754	446	368	2278	17	7
ALKALINE PHOSPHATASE	U/L	26	9	13	52	26	13
ALANINE AMINOTRANSFERASE	U/L	9	6	4	28	23	11
ASPARTATE AMINOTRANSFERASE	U/L	90	65	28	325	26	14
GAMMA GLUTAMYLTRANSFERASE	U/L	26	26	3	75	8	6
AMYLASE	U/L	494.5	229.4	238.7	851.0	5	3
TOTAL PROTEIN (COLORIMETRY)	g/L	74	7	63	86	26	13
GLOBULIN (COLORIMETRY)	g/L	42	6	30	52	23	10
ALBUMIN (COLORIMETRY)	g/L	33	4	22	40	23	10
FIBRINOGEN	g/L	3.500	4.950	.0100	7.000	2	2
Body Temperature:	°C	36.5	0.5	36.0	37.0	13	8

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for females only, ages: 2 – 20 years**

Sample results submitted by 13 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	10.20	2.689	4.700	16.30	39	18
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	7.28	1.04	5.16	9.75	40	17
HEMOGLOBIN	g/L	133	16	103	175	39	16
HEMATOCRIT	L/L	0.391	0.054	0.273	0.528	41	19
MCV	fL	53.7	3.9	46.2	63.4	39	17
MCH	pg/cell	18.6	2.6	15.4	32.2	39	16
MCHC	g/L	346	48	283	608	38	16
PLATELET COUNT	*10 <sup>12</sup> /L	.2130	.0490	.1320	.3200	16	5
NUCLEATED RED BLOOD CELLS	/100 WBC	1	1	0	1	2	2
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	6.223	2.454	2.910	13.20	32	18
LYMPHOCYTES	*10 <sup>9</sup> /L	2.958	0.683	1.790	4.510	36	18
MONOCYTES	*10 <sup>9</sup> /L	0.295	0.282	0.069	1.350	32	15
EOSINOPHILS	*10 <sup>9</sup> /L	0.524	0.448	0.109	1.843	31	15
BASOPHILS	*10 <sup>9</sup> /L	0.058	0.043	0.002	0.104	5	3
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.798	0.374	0.576	1.230	3	2
CALCIUM	mMol/L	2.63	0.23	2.05	3.00	40	17
PHOSPHORUS	mMol/L	1.58	0.29	1.03	2.07	37	17
SODIUM	mMol/L	135	4	128	144	38	16
POTASSIUM	mMol/L	3.8	0.6	2.7	4.9	37	16
CHLORIDE	mMol/L	98	3	93	105	37	16
BICARBONATE	mMol/L	27.0	3.5	25.0	31.0	3	2
CARBON DIOXIDE	mMol/L	25.9	1.9	22.0	29.0	15	5
IRON	μMol/L	22.02	6.444	11.46	28.10	5	4
BLOOD UREA NITROGEN	mMol/L	2.856	.7140	1.428	4.641	41	18
CREATININE	μMol/L	115	27	80	177	36	15
URIC ACID	mMol/L	0.006	0.006	0.000	0.018	11	7
TOTAL BILIRUBIN	μMol/L	9	7	2	39	40	18
DIRECT BILIRUBIN	μMol/L	3	7	0	24	13	7
INDIRECT BILIRUBIN	μMol/L	7	5	2	19	13	7
GLUCOSE	mMol/L	5.162	1.388	2.886	9.102	41	18
CHOLESTEROL	mMol/L	4.921	1.140	2.512	8.806	36	16
TRIGLYCERIDE	mMol/L	.5198	.2373	.1921	1.198	27	11
CREATINE PHOSPHOKINASE	U/L	147	75	80	331	11	8
LACTATE DEHYDROGENASE	U/L	873	498	358	1765	26	11
ALKALINE PHOSPHATASE	U/L	33	19	8	75	38	16
ALANINE AMINOTRANSFERASE	U/L	10	7	2	27	24	14
ASPARTATE AMINOTRANSFERASE	U/L	68	18	39	112	39	16
GAMMA GLUTAMYLTRANSFERASE	U/L	9	4	3	17	13	11
AMYLASE	U/L	512.1	156.3	237.5	697.5	7	6
TOTAL PROTEIN (COLORIMETRY)	g/L	68	7	57	85	38	18
GLOBULIN (COLORIMETRY)	g/L	40	6	30	51	36	16
ALBUMIN (COLORIMETRY)	g/L	28	4	22	37	36	16
FIBRINOGEN	g/L	1.340	1.530	.0100	3.000	3	2
CORTISOL	nMol/L	19	0	19	19	1	1
PROGESTERONE	nMol/L	.0286	.0000	.0286	.0286	1	1
TRIIODOTHYRONINE UPTAKE	%	53	0	53	53	1	1
TOTAL THYROXINE	nMol/L	112	0	112	112	1	1
Body Temperature:	°C	36.1	0.7	35.0	37.0	14	10

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for both sexes combined, ages: 2 – 20 years**

Sample results submitted by 15 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	9.447	2.595	4.600	16.30	68	33
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	7.86	1.53	5.16	12.80	65	28
HEMOGLOBIN	g/L	139	19	103	179	64	27
HEMATOCRIT	L/L	0.407	0.052	0.273	0.531	70	34
MCV	fL	52.3	5.7	39.3	68.3	64	28
MCH	pg/cell	18.0	2.4	13.9	32.2	63	26
MCHC	g/L	345	40	265	608	63	27
PLATELET COUNT	*10 <sup>12</sup> /L	.2130	.0480	.1320	.3200	23	10
NUCLEATED RED BLOOD CELLS	/100 WBC	1	1	0	1	2	2
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	5.509	2.170	2.050	13.20	59	32
LYMPHOCYTES	*10 <sup>9</sup> /L	2.954	0.947	0.558	5.700	64	32
MONOCYTES	*10 <sup>9</sup> /L	0.272	0.236	0.069	1.350	53	27
EOSINOPHILS	*10 <sup>9</sup> /L	0.531	0.403	0.055	1.843	58	29
BASOPHILS	*10 <sup>9</sup> /L	0.064	0.039	0.002	0.104	7	4
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.798	0.374	0.576	1.230	3	2
CALCIUM	mMol/L	2.63	0.23	2.05	3.00	66	29
PHOSPHORUS	mMol/L	1.68	0.32	1.03	2.52	60	26
SODIUM	mMol/L	136	4	126	145	62	26
POTASSIUM	mMol/L	3.7	0.6	2.7	4.9	61	26
CHLORIDE	mMol/L	99	3	93	106	61	26
BICARBONATE	mMol/L	27.0	3.5	25.0	31.0	3	2
CARBON DIOXIDE	mMol/L	26.6	2.2	22.0	30.9	19	9
IRON	µMol/L	20.94	5.728	11.46	33.83	16	7
BLOOD UREA NITROGEN	mMol/L	2.856	.7140	1.428	4.641	68	31
CREATININE	µMol/L	115	27	71	177	58	26
URIC ACID	mMol/L	0.006	0.006	0.000	0.024	23	10
TOTAL BILIRUBIN	µMol/L	9	7	2	27	66	30
DIRECT BILIRUBIN	µMol/L	3	3	0	14	26	11
INDIRECT BILIRUBIN	µMol/L	7	5	2	26	26	11
GLUCOSE	mMol/L	5.328	1.332	2.886	9.102	68	31
CHOLESTEROL	mMol/L	5.646	1.943	2.512	10.15	60	26
TRIGLYCERIDE	mMol/L	.4633	.2147	.1808	1.198	49	20
CREATINE PHOSPHOKINASE	U/L	146	68	80	331	14	11
LACTATE DEHYDROGENASE	U/L	826	476	358	2278	43	17
ALKALINE PHOSPHATASE	U/L	30	16	8	75	64	28
ALANINE AMINOTRANSFERASE	U/L	10	6	2	28	47	24
ASPARTATE AMINOTRANSFERASE	U/L	73	32	28	257	64	28
GAMMA GLUTAMYLTRANSFERASE	U/L	15	18	3	75	21	17
AMYLASE	U/L	504.9	180.4	237.5	851.0	12	9
TOTAL PROTEIN (COLORIMETRY)	g/L	70	8	50	86	65	31
GLOBULIN (COLORIMETRY)	g/L	41	6	30	52	59	26
ALBUMIN (COLORIMETRY)	g/L	30	5	22	40	59	26
FIBRINOGEN	g/L	2.200	2.950	.0100	7.000	5	4
CORTISOL	nMol/L	19	0	19	19	1	1
PROGESTERONE	nMol/L	.0286	.0000	.0286	.0286	1	1
TRIIODOTHYRONINE UPTAKE	%	53	0	53	53	1	1
TOTAL THYROXINE	nMol/L	112	0	112	112	1	1
Body Temperature:	°C	36.3	0.6	35.0	37.0	27	18

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for males only, ages: > 20 years**

Sample results submitted by 4 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	10.07	3.617	5.700	14.00	5	4
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	9.18	0.93	7.82	9.91	4	3
HEMOGLOBIN	g/L	146	11	138	154	2	2
HEMATOCRIT	L/L	0.446	0.043	0.387	0.505	5	4
MCV	fL	48.3	3.5	44.4	52.6	4	3
MCH	pg/cell	17.0	0.8	16.4	17.6	2	2
MCHC	g/L	354	5	350	357	2	2
PLATELET COUNT	*10 <sup>12</sup> /L	.2630	.0000	.2630	.2630	1	1
NUCLEATED RED BLOOD CELLS	/100 WBC	2	0	2	2	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	5.440	1.449	3.530	7.300	5	4
LYMPHOCYTES	*10 <sup>9</sup> /L	3.290	2.006	1.820	6.790	5	4
MONOCYTES	*10 <sup>9</sup> /L	0.352	0.133	0.225	0.536	4	3
EOSINOPHILS	*10 <sup>9</sup> /L	1.031	0.921	0.342	2.613	5	4
BASOPHILS	*10 <sup>9</sup> /L	0.117	0.033	0.093	0.140	2	2
CALCIUM	mMol/L	2.73	0.20	2.45	2.90	4	3
PHOSPHORUS	mMol/L	1.58	0.26	1.36	1.87	4	3
SODIUM	mMol/L	134	3	131	138	4	3
POTASSIUM	mMol/L	4.2	0.4	3.8	4.6	4	3
CHLORIDE	mMol/L	98	1	97	100	4	3
BICARBONATE	mMol/L	25.0	0.0	25.0	25.0	1	1
CARBON DIOXIDE	mMol/L	24.3	4.0	20.0	28.0	3	3
MAGNESIUM	mMol/L	1.070	0.000	1.070	1.070	1	1
BLOOD UREA NITROGEN	mMol/L	2.856	.3570	2.499	2.856	4	3
CREATININE	µMol/L	97	18	71	115	4	3
URIC ACID	mMol/L	0.018	0.000	0.018	0.018	1	1
TOTAL BILIRUBIN	µMol/L	5	2	3	9	4	3
DIRECT BILIRUBIN	µMol/L	2	0	2	2	1	1
INDIRECT BILIRUBIN	µMol/L	2	0	2	2	1	1
GLUCOSE	mMol/L	5.384	.9435	4.496	6.438	4	3
CHOLESTEROL	mMol/L	5.361	1.580	3.600	7.252	4	3
TRIGLYCERIDE	mMol/L	.5650	.2486	.3842	.7345	2	2
CREATINE PHOSPHOKINASE	U/L	130	27	102	161	4	3
LACTATE DEHYDROGENASE	U/L	503	25	485	521	2	2
ALKALINE PHOSPHATASE	U/L	39	14	22	56	4	3
ALANINE AMINOTRANSFERASE	U/L	9	4	4	14	4	3
ASPARTATE AMINOTRANSFERASE	U/L	79	12	65	92	4	3
GAMMA GLUTAMYLTRANSFERASE	U/L	13	8	6	22	3	3
TOTAL PROTEIN (COLORIMETRY)	g/L	70	7	62	77	4	3
GLOBULIN (COLORIMETRY)	g/L	42	6	36	48	4	3
ALBUMIN (COLORIMETRY)	g/L	29	3	25	32	4	3
Body Temperature:	°C	35.0	0.0	35.0	35.0	1	1

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for females only, ages: > 20 years**

Sample results submitted by 2 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	8.500	6.930	3.600	13.40	2	2
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	7.05	0.03	7.03	7.07	2	2
HEMOGLOBIN	g/L	139	2	137	140	2	2
HEMATOCRIT	L/L	0.377	0.034	0.356	0.416	3	2
MCV	fL	54.7	5.8	50.6	58.8	2	2
MCH	pg/cell	19.7	0.2	19.5	19.8	2	2
MCHC	g/L	361	34	337	385	2	2
PLATELET COUNT	*10 <sup>12</sup> /L	.2140	.0000	.2140	.2140	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	3.830	2.164	2.300	5.360	2	2
LYMPHOCYTES	*10 <sup>9</sup> /L	2.670	2.093	1.190	4.150	2	2
MONOCYTES	*10 <sup>9</sup> /L	0.456	0.492	0.108	0.804	2	2
EOSINOPHILS	*10 <sup>9</sup> /L	3.082	0.000	3.082	3.082	1	1
CALCIUM	mMol/L	2.90	0.30	2.68	3.10	2	2
PHOSPHORUS	mMol/L	1.87	0.23	1.71	2.03	2	2
SODIUM	mMol/L	137	1	136	138	2	2
POTASSIUM	mMol/L	4.0	0.0	4.0	4.0	2	2
CHLORIDE	mMol/L	101	1	100	101	2	2
BICARBONATE	mMol/L	23.0	0.0	23.0	23.0	1	1
CARBON DIOXIDE	mMol/L	28.0	0.0	28.0	28.0	1	1
IRON	µMol/L	29.36	.0000	29.36	29.36	1	1
BLOOD UREA NITROGEN	mMol/L	4.641	.7140	3.927	4.998	2	2
CREATININE	µMol/L	133	0	133	133	2	2
URIC ACID	mMol/L	0.030	0.000	0.030	0.030	1	1
TOTAL BILIRUBIN	µMol/L	5	2	3	7	2	2
DIRECT BILIRUBIN	µMol/L	2	0	2	2	1	1
INDIRECT BILIRUBIN	µMol/L	2	0	2	2	1	1
GLUCOSE	mMol/L	5.217	.2220	5.051	5.328	2	2
CHOLESTEROL	mMol/L	4.403	.0518	4.351	4.429	2	2
TRIGLYCERIDE	mMol/L	.5537	.0678	.4972	.5989	2	2
CREATINE PHOSPHOKINASE	U/L	190	0	190	190	1	1
LACTATE DEHYDROGENASE	U/L	450	0	450	450	1	1
ALKALINE PHOSPHATASE	U/L	12	11	4	20	2	2
ALANINE AMINOTRANSFERASE	U/L	9	3	7	11	2	2
ASPARTATE AMINOTRANSFERASE	U/L	72	2	70	73	2	2
AMYLASE	U/L	671.2	.0000	671.2	671.2	1	1
TOTAL PROTEIN (COLORIMETRY)	g/L	71	3	69	73	2	2
GLOBULIN (COLORIMETRY)	g/L	39	4	36	42	2	2
ALBUMIN (COLORIMETRY)	g/L	32	1	31	33	2	2
Body Temperature:	°C	36.0	0.0	36.0	36.0	1	1

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for both sexes combined, ages: > 20 years**

Sample results submitted by 5 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	9.624	4.161	3.600	14.00	7	6
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	8.47	1.32	7.03	9.91	6	5
HEMOGLOBIN	g/L	142	8	137	154	4	4
HEMATOCRIT	L/L	0.421	0.051	0.356	0.505	8	6
MCV	fL	50.5	5.0	44.4	58.8	6	5
MCH	pg/cell	18.3	1.6	16.4	19.8	4	4
MCHC	g/L	357	20	337	385	4	4
PLATELET COUNT	*10 <sup>12</sup> /L	.2390	.0350	.2140	.2630	2	2
NUCLEATED RED BLOOD CELLS	/100 WBC	2	0	2	2	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	4.980	1.673	2.300	7.300	7	6
LYMPHOCYTES	*10 <sup>9</sup> /L	3.113	1.872	1.190	6.790	7	6
MONOCYTES	*10 <sup>9</sup> /L	0.387	0.249	0.108	0.804	6	5
EOSINOPHILS	*10 <sup>9</sup> /L	1.373	1.175	0.342	3.082	6	5
BASOPHILS	*10 <sup>9</sup> /L	0.117	0.033	0.093	0.140	2	2
CALCIUM	mMol/L	2.78	0.23	2.45	3.10	6	5
PHOSPHORUS	mMol/L	1.68	0.26	1.36	2.03	6	5
SODIUM	mMol/L	135	3	131	138	6	5
POTASSIUM	mMol/L	4.2	0.3	3.8	4.6	6	5
CHLORIDE	mMol/L	99	2	97	101	6	5
BICARBONATE	mMol/L	24.0	1.4	23.0	25.0	2	2
CARBON DIOXIDE	mMol/L	25.3	3.8	20.0	28.0	4	4
IRON	µMol/L	29.36	.0000	29.36	29.36	1	1
MAGNESIUM	mMol/L	1.070	0.000	1.070	1.070	1	1
BLOOD UREA NITROGEN	mMol/L	3.213	1.071	2.499	4.998	6	5
CREATININE	µMol/L	115	27	71	133	6	5
URIC ACID	mMol/L	0.024	0.006	0.018	0.030	2	2
TOTAL BILIRUBIN	µMol/L	5	2	3	9	6	5
DIRECT BILIRUBIN	µMol/L	2	0	2	2	2	2
INDIRECT BILIRUBIN	µMol/L	2	0	2	2	2	2
GLUCOSE	mMol/L	5.328	.7215	4.496	6.438	6	5
CHOLESTEROL	mMol/L	5.025	1.321	3.600	7.252	6	5
TRIGLYCERIDE	mMol/L	.5537	.1469	.3842	.7345	4	4
CREATINE PHOSPHOKINASE	U/L	142	35	102	190	5	4
LACTATE DEHYDROGENASE	U/L	485	36	450	521	3	3
ALKALINE PHOSPHATASE	U/L	30	19	4	56	6	5
ALANINE AMINOTRANSFERASE	U/L	9	4	4	14	6	5
ASPARTATE AMINOTRANSFERASE	U/L	76	10	65	92	6	5
GAMMA GLUTAMYLTRANSFERASE	U/L	13	8	6	22	3	3
AMYLASE	U/L	671.2	.0000	671.2	671.2	1	1
TOTAL PROTEIN (COLORIMETRY)	g/L	71	6	62	77	6	5
GLOBULIN (COLORIMETRY)	g/L	41	5	36	48	6	5
ALBUMIN (COLORIMETRY)	g/L	30	3	25	33	6	5
Body Temperature:	°C	35.5	0.7	35.0	36.0	2	2

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.



**Physiological reference ranges calculated for males only, all ages combined**

Sample results submitted by 13 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	9.134	3.326	4.600	20.50	39	21
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	8.70	1.60	6.24	12.80	33	15
HEMOGLOBIN	g/L	144	22	101	179	31	15
HEMATOCRIT	L/L	0.425	0.052	0.290	0.531	39	21
MCV	fL	49.3	7.3	38.4	68.3	33	15
MCH	pg/cell	16.8	2.0	13.1	20.7	30	14
MCHC	g/L	344	26	265	381	31	15
PLATELET COUNT	*10 <sup>12</sup> /L	.2340	.0610	.1340	.3450	9	7
NUCLEATED RED BLOOD CELLS	/100 WBC	2	0	2	2	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	5.058	2.122	2.050	13.90	37	20
LYMPHOCYTES	*10 <sup>9</sup> /L	3.171	1.534	0.558	7.730	38	20
MONOCYTES	*10 <sup>9</sup> /L	0.271	0.155	0.072	0.625	30	17
EOSINOPHILS	*10 <sup>9</sup> /L	0.630	0.514	0.055	2.613	37	20
BASOPHILS	*10 <sup>9</sup> /L	0.098	0.035	0.055	0.140	4	3
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.205	0.000	0.205	0.205	1	1
CALCIUM	mMol/L	2.65	0.23	2.33	3.08	34	18
PHOSPHORUS	mMol/L	1.81	0.36	1.20	2.62	30	14
SODIUM	mMol/L	137	4	126	145	31	15
POTASSIUM	mMol/L	3.6	0.6	2.9	4.6	31	15
CHLORIDE	mMol/L	99	3	93	106	31	15
BICARBONATE	mMol/L	25.0	0.0	25.0	25.0	1	1
CARBON DIOXIDE	mMol/L	26.9	3.4	20.0	30.9	10	9
IRON	µMol/L	20.23	5.549	14.86	33.83	11	3
MAGNESIUM	mMol/L	0.852	0.226	0.617	1.070	3	2
BLOOD UREA NITROGEN	mMol/L	3.213	1.071	1.428	6.783	34	19
CREATININE	µMol/L	106	27	44	177	30	17
URIC ACID	mMol/L	0.012	0.012	0.000	0.042	16	5
TOTAL BILIRUBIN	µMol/L	10	7	2	27	35	19
DIRECT BILIRUBIN	µMol/L	5	3	0	14	16	7
INDIRECT BILIRUBIN	µMol/L	9	7	2	26	16	7
GLUCOSE	mMol/L	5.661	1.277	3.386	9.047	36	19
CHOLESTEROL	mMol/L	6.087	2.461	2.150	10.15	32	16
TRIGLYCERIDE	mMol/L	.4181	.1808	.1808	.8362	27	13
CREATINE PHOSPHOKINASE	U/L	134	57	55	256	10	8
LACTATE DEHYDROGENASE	U/L	696	419	306	2278	21	9
ALKALINE PHOSPHATASE	U/L	31	15	13	90	33	17
ALANINE AMINOTRANSFERASE	U/L	11	7	4	33	31	16
ASPARTATE AMINOTRANSFERASE	U/L	90	61	28	325	34	19
GAMMA GLUTAMYLTRANSFERASE	U/L	37	63	3	254	15	12
AMYLASE	U/L	528.9	221.8	238.7	851.0	6	4
TOTAL PROTEIN (COLORIMETRY)	g/L	73	7	61	86	33	17
GLOBULIN (COLORIMETRY)	g/L	42	6	30	53	29	14
ALBUMIN (COLORIMETRY)	g/L	32	4	22	40	29	14
FIBRINOGEN	g/L	3.500	4.950	.0100	7.000	2	2
Body Temperature:	°C	36.4	0.6	35.0	37.0	14	9

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for females only, all ages combined**

Sample results submitted by 18 member institutions.

<b>Test</b>	<b>Units</b>	<b>Mean</b>	<b>St. Dev.</b>	<b>Minimum Value</b>	<b>Maximum Value</b>	<b>Sample Size<sup>a</sup></b>	<b>Animals<sup>b</sup></b>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	10.05	2.793	3.600	16.30	55	28
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	7.62	1.37	5.16	11.60	55	27
HEMOGLOBIN	g/L	133	17	95	175	51	24
HEMATOCRIT	L/L	0.391	0.063	0.270	0.633	57	28
MCV	fL	52.2	8.7	30.9	94.1	53	26
MCH	pg/cell	17.9	2.8	12.0	32.2	51	24
MCHC	g/L	343	48	194	608	51	24
PLATELET COUNT	*10 <sup>12</sup> /L	.2160	.0460	.1320	.3200	19	7
NUCLEATED RED BLOOD CELLS	/100 WBC	1	1	0	1	2	2
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	5.970	2.485	2.300	13.20	47	28
LYMPHOCYTES	*10 <sup>9</sup> /L	3.077	1.076	0.612	6.200	51	28
MONOCYTES	*10 <sup>9</sup> /L	0.273	0.263	0.036	1.350	45	25
EOSINOPHILS	*10 <sup>9</sup> /L	0.537	0.579	0.106	3.082	42	23
BASOPHILS	*10 <sup>9</sup> /L	0.071	0.039	0.002	0.115	8	5
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.809	0.595	0.072	1.580	5	4
CALCIUM	mMol/L	2.65	0.23	2.05	3.10	53	25
PHOSPHORUS	mMol/L	1.71	0.42	1.03	3.29	49	25
SODIUM	mMol/L	135	4	128	144	49	23
POTASSIUM	mMol/L	3.9	0.6	2.7	5.1	49	24
CHLORIDE	mMol/L	98	3	90	106	49	24
BICARBONATE	mMol/L	25.2	3.5	22.0	31.0	5	4
CARBON DIOXIDE	mMol/L	25.7	2.1	22.0	29.0	19	9
IRON	µMol/L	23.99	7.876	11.46	38.84	10	6
BLOOD UREA NITROGEN	mMol/L	2.856	.7140	1.428	4.998	53	25
CREATININE	µMol/L	115	27	53	177	48	23
URIC ACID	mMol/L	0.012	0.006	0.000	0.030	16	9
TOTAL BILIRUBIN	µMol/L	10	7	2	27	52	26
DIRECT BILIRUBIN	µMol/L	3	3	0	12	22	13
INDIRECT BILIRUBIN	µMol/L	7	5	2	19	22	13
GLUCOSE	mMol/L	5.550	1.554	2.886	9.380	54	26
CHOLESTEROL	mMol/L	4.895	1.191	2.486	8.806	47	23
TRIGLYCERIDE	mMol/L	.5198	.2260	.1808	1.198	33	14
CREATINE PHOSPHOKINASE	U/L	162	93	59	418	17	13
LACTATE DEHYDROGENASE	U/L	799	474	358	1765	32	13
ALKALINE PHOSPHATASE	U/L	87	214	2	1176	50	23
ALANINE AMINOTRANSFERASE	U/L	9	6	2	27	35	22
ASPARTATE AMINOTRANSFERASE	U/L	72	21	39	145	52	25
GAMMA GLUTAMYLTRANSFERASE	U/L	9	4	3	17	16	13
AMYLASE	U/L	493.2	194.6	101.2	697.5	10	9
TOTAL PROTEIN (COLORIMETRY)	g/L	67	7	55	85	51	26
GLOBULIN (COLORIMETRY)	g/L	39	7	23	54	48	23
ALBUMIN (COLORIMETRY)	g/L	29	5	18	42	48	23
FIBRINOGEN	g/L	2.000	1.260	.0100	3.000	6	4
CORTISOL	nMol/L	19	0	19	19	1	1
PROGESTERONE	nMol/L	.0286	.0000	.0286	.0286	1	1
TRIIODOTHYRONINE UPTAKE	%	53	0	53	53	1	1
TOTAL THYROXINE	nMol/L	112	0	112	112	1	1
Body Temperature:	°C	36.2	0.6	35.0	37.0	19	13

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for both sexes combined, all ages combined**

Sample results submitted by 19 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	9.669	3.042	3.600	20.50	94	48
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	8.02	1.54	5.16	12.80	88	41
HEMOGLOBIN	g/L	137	19	95	179	82	38
HEMATOCRIT	L/L	0.405	0.061	0.270	0.633	96	48
MCV	fL	51.1	8.3	30.9	94.1	86	40
MCH	pg/cell	17.5	2.6	12.0	32.2	81	37
MCHC	g/L	343	41	194	608	82	38
PLATELET COUNT	*10 <sup>12</sup> /L	.2220	.0510	.1320	.3450	28	13
NUCLEATED RED BLOOD CELLS	/100 WBC	1	1	0	2	3	3
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	5.568	2.363	2.050	13.90	84	47
LYMPHOCYTES	*10 <sup>9</sup> /L	3.117	1.284	0.558	7.730	89	47
MONOCYTES	*10 <sup>9</sup> /L	0.272	0.224	0.036	1.350	75	41
EOSINOPHILS	*10 <sup>9</sup> /L	0.580	0.548	0.055	3.082	79	42
BASOPHILS	*10 <sup>9</sup> /L	0.080	0.038	0.002	0.140	12	7
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.709	0.587	0.072	1.580	6	5
CALCIUM	mMol/L	2.65	0.23	2.05	3.10	87	42
PHOSPHORUS	mMol/L	1.74	0.39	1.03	3.29	79	38
SODIUM	mMol/L	136	4	126	148	81	38
POTASSIUM	mMol/L	3.8	0.6	2.7	5.1	80	38
CHLORIDE	mMol/L	99	3	90	106	80	38
BICARBONATE	mMol/L	25.2	3.1	22.0	31.0	6	5
CARBON DIOXIDE	mMol/L	26.2	2.6	20.0	30.9	29	17
IRON	µMol/L	22.02	6.802	11.46	38.84	21	9
MAGNESIUM	mMol/L	0.852	0.226	0.617	1.070	3	2
BLOOD UREA NITROGEN	mMol/L	2.856	1.071	1.071	6.783	88	43
CREATININE	µMol/L	115	27	53	177	77	38
URIC ACID	mMol/L	0.012	0.012	0.000	0.042	32	14
TOTAL BILIRUBIN	µMol/L	10	7	2	27	87	44
DIRECT BILIRUBIN	µMol/L	3	3	0	14	38	20
INDIRECT BILIRUBIN	µMol/L	7	5	2	26	38	20
GLUCOSE	mMol/L	5.606	1.443	2.886	9.380	90	44
CHOLESTEROL	mMol/L	5.387	1.891	2.150	10.15	79	38
TRIGLYCERIDE	mMol/L	.4746	.2034	.1808	1.198	60	26
CREATINE PHOSPHOKINASE	U/L	151	82	55	418	27	20
LACTATE DEHYDROGENASE	U/L	758	452	306	2278	53	21
ALKALINE PHOSPHATASE	U/L	33	20	2	101	80	37
ALANINE AMINOTRANSFERASE	U/L	10	6	2	33	66	37
ASPARTATE AMINOTRANSFERASE	U/L	76	33	28	257	85	42
GAMMA GLUTAMYLTRANSFERASE	U/L	26	50	3	254	32	24
AMYLASE	U/L	506.5	198.7	101.2	851.0	16	13
TOTAL PROTEIN (COLORIMETRY)	g/L	69	8	50	86	85	43
GLOBULIN (COLORIMETRY)	g/L	40	7	23	54	77	36
ALBUMIN (COLORIMETRY)	g/L	30	5	18	42	77	36
FIBRINOGEN	g/L	2.380	2.260	.0100	7.000	8	6
CORTISOL	nMol/L	19	0	19	19	1	1
PROGESTERONE	nMol/L	.0286	.0000	.0286	.0286	1	1
TRIIODOTHYRONINE UPTAKE	%	53	0	53	53	1	1
TOTAL THYROXINE	nMol/L	112	0	112	112	1	1
Body Temperature:	°C	36.3	0.6	35.0	37.0	33	22

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

# Lowland Tapir – *Tapirus terrestris*

## Average weights calculated for both sexes combined

Weights submitted by ISIS member institutions.

Age Grouping	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
0-1 days	Kg	8.413	2.157	5.100	11.30	10	9
0.9-1.1 months	Kg	20.06	4.04	14.55	25.59	10	5

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Normal Physiological Values  
for Baird's Tapir  
*Tapirus Bairdii***

International Species Information System

2002

**Physiological reference ranges calculated for males only, ages: < 8 days**

Sample results submitted by 3 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	10.61	1.873	8.700	14.50	8	5
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	7.81	1.29	6.22	9.24	6	4
HEMOGLOBIN	g/L	107	15	84	121	6	4
HEMATOCRIT	L/L	0.331	0.041	0.257	0.379	8	5
MCV	fL	41.7	2.6	39.0	46.3	6	4
MCH	pg/cell	13.9	1.7	12.9	17.4	6	4
MCHC	g/L	332	23	309	375	6	4
PLATELET COUNT	*10 <sup>12</sup> /L	.1020	.0100	.0950	.1090	2	2
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	7.135	1.921	5.310	11.50	8	5
LYMPHOCYTES	*10 <sup>9</sup> /L	3.130	1.072	2.040	4.880	8	5
MONOCYTES	*10 <sup>9</sup> /L	0.459	0.147	0.306	0.600	3	3
EOSINOPHILS	*10 <sup>9</sup> /L	0.262	0.158	0.094	0.408	3	2
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.340	0.339	0.100	0.580	2	2
CALCIUM	mMol/L	2.45	0.13	2.25	2.63	5	4
PHOSPHORUS	mMol/L	1.78	0.16	1.65	1.97	4	4
SODIUM	mMol/L	142	4	136	146	4	4
POTASSIUM	mMol/L	3.6	0.2	3.5	3.8	4	4
CHLORIDE	mMol/L	103	6	94	108	4	4
IRON	µMol/L	13.78	.0000	13.78	13.78	1	1
BLOOD UREA NITROGEN	mMol/L	3.927	1.071	2.856	5.355	5	4
CREATININE	µMol/L	177	106	62	301	5	4
URIC ACID	mMol/L	0.060	0.101	0.000	0.238	5	4
TOTAL BILIRUBIN	µMol/L	29	32	14	87	5	4
GLUCOSE	mMol/L	4.884	1.110	3.885	6.605	5	4
CHOLESTEROL	mMol/L	2.771	.5957	2.202	3.522	5	4
TRIGLYCERIDE	mMol/L	.5085	.2486	.2034	.8362	5	4
LACTATE DEHYDROGENASE	U/L	724	608	305	1612	4	4
ALKALINE PHOSPHATASE	U/L	776	413	468	1365	4	4
ALANINE AMINOTRANSFERASE	U/L	10	6	1	18	5	4
ASPARTATE AMINOTRANSFERASE	U/L	86	57	37	150	5	4
GAMMA GLUTAMYLTRANSFERASE	U/L	40	36	18	94	4	3
AMYLASE	U/L	193.3	172.4	85.29	392.2	3	3
TOTAL PROTEIN (COLORIMETRY)	g/L	49	12	39	66	6	4
GLOBULIN (COLORIMETRY)	g/L	30	13	16	43	5	4
ALBUMIN (COLORIMETRY)	g/L	21	2	18	24	5	4

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for females only, ages: < 8 days**

Sample results submitted by 1 member institution.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	9.000	0.000	9.000	9.000	1	1
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	4.15	0.00	4.15	4.15	1	1
HEMOGLOBIN	g/L	74	0	74	74	1	1
HEMATOCRIT	L/L	0.200	0.000	0.200	0.200	1	1
MCV	fL	48.2	0.0	48.2	48.2	1	1
MCH	pg/cell	17.8	0.0	17.8	17.8	1	1
MCHC	g/L	370	0	370	370	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	4.950	0.000	4.950	4.950	1	1
LYMPHOCYTES	*10 <sup>9</sup> /L	3.060	0.000	3.060	3.060	1	1
MONOCYTES	*10 <sup>9</sup> /L	0.090	0.000	0.090	0.090	1	1
EOSINOPHILS	*10 <sup>9</sup> /L	0.270	0.000	0.270	0.270	1	1
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.630	0.000	0.630	0.630	1	1
CALCIUM	mMol/L	2.78	0.00	2.78	2.78	1	1
PHOSPHORUS	mMol/L	2.20	0.00	2.20	2.20	1	1
SODIUM	mMol/L	136	0	136	136	1	1
POTASSIUM	mMol/L	3.8	0.0	3.8	3.8	1	1
CHLORIDE	mMol/L	94	0	94	94	1	1
CARBON DIOXIDE	mMol/L	20.0	0.0	20.0	20.0	1	1
BLOOD UREA NITROGEN	mMol/L	5.355	.0000	5.355	5.355	1	1
CREATININE	µMol/L	71	0	71	71	1	1
URIC ACID	mMol/L	0.030	0.000	0.030	0.030	1	1
TOTAL BILIRUBIN	µMol/L	9	0	9	9	1	1
DIRECT BILIRUBIN	µMol/L	3	0	3	3	1	1
INDIRECT BILIRUBIN	µMol/L	5	0	5	5	1	1
GLUCOSE	mMol/L	5.939	.0000	5.939	5.939	1	1
CHOLESTEROL	mMol/L	3.263	.0000	3.263	3.263	1	1
TRIGLYCERIDE	mMol/L	1.175	.0000	1.175	1.175	1	1
CREATINE PHOSPHOKINASE	U/L	144	0	144	144	1	1
LACTATE DEHYDROGENASE	U/L	1837	0	1837	1837	1	1
ALKALINE PHOSPHATASE	U/L	1589	0	1589	1589	1	1
ALANINE AMINOTRANSFERASE	U/L	18	0	18	18	1	1
ASPARTATE AMINOTRANSFERASE	U/L	108	0	108	108	1	1
GAMMA GLUTAMYLTRANSFERASE	U/L	58	0	58	58	1	1
AMYLASE	U/L	613.5	.0000	613.5	613.5	1	1
TOTAL PROTEIN (COLORIMETRY)	g/L	55	0	55	55	1	1
GLOBULIN (COLORIMETRY)	g/L	36	0	36	36	1	1
ALBUMIN (COLORIMETRY)	g/L	19	0	19	19	1	1

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for both sexes combined, ages: < 8 days**

Sample results submitted by 3 member institutions

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	10.43	1.833	8.700	14.50	9	6
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	7.29	1.82	4.15	9.24	7	5
HEMOGLOBIN	g/L	103	19	74	121	7	5
HEMATOCRIT	L/L	0.316	0.058	0.200	0.379	9	6
MCV	fL	42.6	3.4	39.0	48.2	7	5
MCH	pg/cell	14.4	2.2	12.9	17.8	7	5
MCHC	g/L	337	26	309	375	7	5
PLATELET COUNT	*10 <sup>12</sup> /L	.1020	.0100	.0950	.1090	2	2
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	6.892	1.939	4.950	11.50	9	6
LYMPHOCYTES	*10 <sup>9</sup> /L	3.122	1.003	2.040	4.880	9	6
MONOCYTES	*10 <sup>9</sup> /L	0.367	0.220	0.090	0.600	4	4
EOSINOPHILS	*10 <sup>9</sup> /L	0.264	0.129	0.094	0.408	4	3
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.437	0.293	0.100	0.630	3	3
CALCIUM	mMol/L	2.50	0.18	2.25	2.78	6	5
PHOSPHORUS	mMol/L	1.87	0.23	1.65	2.20	5	5
SODIUM	mMol/L	141	5	136	146	5	5
POTASSIUM	mMol/L	3.7	0.2	3.5	3.8	5	5
CHLORIDE	mMol/L	101	7	94	108	5	5
CARBON DIOXIDE	mMol/L	20.0	0.0	20.0	20.0	1	1
IRON	µMol/L	13.78	.0000	13.78	13.78	1	1
BLOOD UREA NITROGEN	mMol/L	4.284	1.071	2.856	5.355	6	5
CREATININE	µMol/L	159	106	62	301	6	5
URIC ACID	mMol/L	0.054	0.089	0.000	0.238	6	5
TOTAL BILIRUBIN	µMol/L	26	31	9	87	6	5
DIRECT BILIRUBIN	µMol/L	3	0	3	3	1	1
INDIRECT BILIRUBIN	µMol/L	5	0	5	5	1	1
GLUCOSE	mMol/L	5.051	1.110	3.885	6.605	6	5
CHOLESTEROL	mMol/L	2.849	.5698	2.202	3.522	6	5
TRIGLYCERIDE	mMol/L	.6215	.3503	.2034	1.175	6	5
CREATINE PHOSPHOKINASE	U/L	144	0	144	144	1	1
LACTATE DEHYDROGENASE	U/L	946	725	305	1837	5	5
ALKALINE PHOSPHATASE	U/L	938	510	468	1589	5	5
ALANINE AMINOTRANSFERASE	U/L	11	6	1	18	6	5
ASPARTATE AMINOTRANSFERASE	U/L	90	52	37	150	6	5
GAMMA GLUTAMYLTRANSFERASE	U/L	43	33	18	94	5	4
AMYLASE	U/L	298.4	252.9	85.29	613.5	4	4
TOTAL PROTEIN (COLORIMETRY)	g/L	50	11	39	66	7	5
GLOBULIN (COLORIMETRY)	g/L	31	12	16	43	6	5
ALBUMIN (COLORIMETRY)	g/L	21	2	18	24	6	5

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.



**Physiological reference ranges calculated for males only, ages: 8 days – 2 years**

Sample results submitted by 3 member institutions

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	9.123	2.905	5.800	14.30	10	7
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	7.63	1.29	5.96	9.96	10	7
HEMOGLOBIN	g/L	119	14	95	141	10	7
HEMATOCRIT	L/L	0.342	0.054	0.268	0.432	10	7
MCV	fL	45.5	7.4	35.4	59.1	10	7
MCH	pg/cell	15.8	2.3	12.2	20.5	10	7
MCHC	g/L	348	18	326	379	10	7
PLATELET COUNT	*10 <sup>12</sup> /L	.4840	.0000	.4840	.4840	1	1
NUCLEATED RED BLOOD CELLS	/100 WBC	0	0	0	0	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	4.587	2.250	2.540	9.020	10	7
LYMPHOCYTES	*10 <sup>9</sup> /L	3.896	1.656	1.180	5.440	10	7
MONOCYTES	*10 <sup>9</sup> /L	0.403	0.292	0.170	0.858	8	6
EOSINOPHILS	*10 <sup>9</sup> /L	0.169	0.104	0.065	0.290	8	6
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	1.830	0.000	1.830	1.830	1	1
CALCIUM	mMol/L	2.80	0.25	2.48	3.15	8	6
PHOSPHORUS	mMol/L	2.26	0.32	1.94	2.71	7	5
SODIUM	mMol/L	133	3	126	136	7	6
POTASSIUM	mMol/L	4.1	0.7	3.3	5.3	8	6
CHLORIDE	mMol/L	97	3	94	104	8	6
CARBON DIOXIDE	mMol/L	21.2	4.3	16.0	27.0	6	5
OSMOLARITY	Osmol/L	.2640	.0000	.2640	.2640	1	1
IRON	μMol/L	31.15	10.38	23.81	38.49	2	2
BLOOD UREA NITROGEN	mMol/L	3.570	1.071	2.499	5.355	8	6
CREATININE	μMol/L	80	18	53	97	8	6
URIC ACID	mMol/L	0.006	0.012	0.000	0.018	4	3
TOTAL BILIRUBIN	μMol/L	15	5	9	24	8	6
DIRECT BILIRUBIN	μMol/L	2	0	2	2	1	1
INDIRECT BILIRUBIN	μMol/L	10	0	10	10	1	1
GLUCOSE	mMol/L	5.717	.7770	4.662	6.938	7	6
CHOLESTEROL	mMol/L	5.361	.7770	4.610	6.346	7	5
TRIGLYCERIDE	mMol/L	.4294	.1921	.2373	.6893	5	4
CREATINE PHOSPHOKINASE	U/L	266	53	208	313	3	3
LACTATE DEHYDROGENASE	U/L	1264	660	560	2022	6	4
ALKALINE PHOSPHATASE	U/L	224	214	49	725	8	6
ALANINE AMINOTRANSFERASE	U/L	11	6	6	24	8	6
ASPARTATE AMINOTRANSFERASE	U/L	100	24	67	131	8	6
GAMMA GLUTAMYLTRANSFERASE	U/L	15	4	11	20	6	4
AMYLASE	U/L	264.7	68.82	180.0	320.8	4	3
TOTAL PROTEIN (COLORIMETRY)	g/L	67	11	42	79	8	6
GLOBULIN (COLORIMETRY)	g/L	37	8	24	50	8	6
ALBUMIN (COLORIMETRY)	g/L	30	7	18	41	8	6
Body Temperature:	°C	37.0	0.0	37.0	37.0	2	1

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for females only, ages: 8 days – 2 years**

Sample results submitted by 2 member institutions

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	10.73	1.340	9.800	12.70	4	4
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	7.24	1.00	6.37	8.63	4	4
HEMOGLOBIN	g/L	115	7	106	122	4	4
HEMATOCRIT	L/L	0.336	0.024	0.310	0.372	5	5
MCV	fL	47.9	5.7	39.4	51.2	4	4
MCH	pg/cell	16.1	1.6	13.9	17.7	4	4
MCHC	g/L	337	20	312	353	4	4
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	5.425	1.576	4.160	7.450	4	4
LYMPHOCYTES	*10 <sup>9</sup> /L	4.638	2.757	1.670	7.750	4	4
MONOCYTES	*10 <sup>9</sup> /L	0.389	0.222	0.208	0.700	4	4
EOSINOPHILS	*10 <sup>9</sup> /L	0.227	0.038	0.200	0.254	2	2
BASOPHILS	*10 <sup>9</sup> /L	0.177	0.109	0.100	0.254	2	2
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.098	0.000	0.098	0.098	1	1
CALCIUM	mMol/L	2.85	0.35	2.58	3.23	3	3
PHOSPHORUS	mMol/L	2.16	0.90	1.32	3.13	3	3
SODIUM	mMol/L	128	10	116	136	3	3
POTASSIUM	mMol/L	3.8	0.2	3.7	4.0	3	3
CHLORIDE	mMol/L	90	10	79	96	3	3
CARBON DIOXIDE	mMol/L	21.0	0.0	21.0	21.0	1	1
BLOOD UREA NITROGEN	mMol/L	3.570	.7140	3.213	4.284	3	3
CREATININE	μMol/L	115	35	88	133	2	2
URIC ACID	mMol/L	0.018	0.000	0.018	0.018	1	1
TOTAL BILIRUBIN	μMol/L	14	0	14	14	2	2
DIRECT BILIRUBIN	μMol/L	2	0	2	2	1	1
INDIRECT BILIRUBIN	μMol/L	12	0	12	12	1	1
GLUCOSE	mMol/L	5.273	2.831	2.109	7.659	3	3
CHOLESTEROL	mMol/L	4.869	1.166	3.600	5.905	3	3
TRIGLYCERIDE	mMol/L	.3842	.1582	.2712	.4972	2	2
CREATINE PHOSPHOKINASE	U/L	168	43	135	217	3	3
LACTATE DEHYDROGENASE	U/L	1108	1127	311	1905	2	2
ALKALINE PHOSPHATASE	U/L	152	59	95	212	3	3
ALANINE AMINOTRANSFERASE	U/L	24	8	19	33	3	3
ASPARTATE AMINOTRANSFERASE	U/L	104	50	71	162	3	3
GAMMA GLUTAMYLTRANSFERASE	U/L	22	6	18	26	2	2
AMYLASE	U/L	570.9	.0000	570.9	570.9	1	1
TOTAL PROTEIN (COLORIMETRY)	g/L	59	14	49	69	2	2
GLOBULIN (COLORIMETRY)	g/L	40	0	40	40	1	1
ALBUMIN (COLORIMETRY)	g/L	29	0	29	29	1	1
FIBRINOGEN	g/L	.0100	.0000	.0100	.0100	1	1

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated both sexes combined, ages: 8 days – 2 years**

Sample results submitted by 4 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	9.581	2.612	5.800	14.30	14	11
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	7.52	1.19	5.96	9.96	14	11
HEMOGLOBIN	g/L	118	13	95	141	14	11
HEMATOCRIT	L/L	0.340	0.045	0.268	0.432	15	12
MCV	fL	46.2	6.9	35.4	59.1	14	11
MCH	pg/cell	15.9	2.1	12.2	20.5	14	11
MCHC	g/L	345	19	312	379	14	11
PLATELET COUNT	*10 <sup>12</sup> /L	.4840	.0000	.4840	.4840	1	1
NUCLEATED RED BLOOD CELLS	/100 WBC	0	0	0	0	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	4.826	2.057	2.540	9.020	14	11
LYMPHOCYTES	*10 <sup>9</sup> /L	4.108	1.942	1.180	7.750	14	11
MONOCYTES	*10 <sup>9</sup> /L	0.398	0.260	0.170	0.858	12	10
EOSINOPHILS	*10 <sup>9</sup> /L	0.181	0.096	0.065	0.290	10	8
BASOPHILS	*10 <sup>9</sup> /L	0.177	0.109	0.100	0.254	2	2
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.964	1.225	0.098	1.830	2	2
CALCIUM	mMol/L	2.80	0.25	2.48	3.23	11	9
PHOSPHORUS	mMol/L	2.23	0.52	1.32	3.13	10	8
SODIUM	mMol/L	131	6	116	136	10	9
POTASSIUM	mMol/L	4.0	0.6	3.3	5.3	11	9
CHLORIDE	mMol/L	95	6	79	104	11	9
CARBON DIOXIDE	mMol/L	21.1	3.9	16.0	27.0	7	6
OSMOLARITY	Osmol/L	.2640	.0000	.2640	.2640	1	1
IRON	µMol/L	31.15	10.38	23.81	38.49	2	2
BLOOD UREA NITROGEN	mMol/L	3.570	.7140	2.499	5.355	11	9
CREATININE	µMol/L	88	27	53	133	10	8
URIC ACID	mMol/L	0.012	0.012	0.000	0.018	5	4
TOTAL BILIRUBIN	µMol/L	15	5	9	24	10	8
DIRECT BILIRUBIN	µMol/L	2	0	2	2	2	2
INDIRECT BILIRUBIN	µMol/L	12	2	10	12	2	2
GLUCOSE	mMol/L	5.550	1.499	2.109	7.659	10	9
CHOLESTEROL	mMol/L	5.206	.8806	3.600	6.346	10	8
TRIGLYCERIDE	mMol/L	.4181	.1695	.2373	.6893	7	6
CREATINE PHOSPHOKINASE	U/L	217	69	135	313	6	6
LACTATE DEHYDROGENASE	U/L	1225	706	311	2022	8	6
ALKALINE PHOSPHATASE	U/L	204	184	49	725	11	9
ALANINE AMINOTRANSFERASE	U/L	15	9	6	33	11	9
ASPARTATE AMINOTRANSFERASE	U/L	101	30	67	162	11	9
GAMMA GLUTAMYLTRANSFERASE	U/L	17	5	11	26	8	6
AMYLASE	U/L	326.0	149.3	180.0	570.9	5	4
TOTAL PROTEIN (COLORIMETRY)	g/L	65	11	42	79	10	8
GLOBULIN (COLORIMETRY)	g/L	37	8	24	50	9	7
ALBUMIN (COLORIMETRY)	g/L	30	6	18	41	9	7
FIBRINOGEN	g/L	.0100	.0000	.0100	.0100	1	1
Body Temperature:	°C	37.0	0.0	37.0	37.0	2	1

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for males only, ages: 2 – 20 years**

Sample results submitted by 7 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	6.767	1.955	4.000	13.00	24	11
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	6.51	0.98	4.52	8.46	25	11
HEMOGLOBIN	g/L	114	16	80	164	25	11
HEMATOCRIT	L/L	0.328	0.048	0.220	0.444	27	11
MCV	fL	50.8	3.0	46.8	57.0	25	11
MCH	pg/cell	17.7	1.3	14.5	19.4	25	11
MCHC	g/L	348	23	276	377	25	11
PLATELET COUNT	*10 <sup>12</sup> /L	.2680	.0680	.2000	.3700	5	4
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	3.850	1.159	1.900	6.240	22	9
LYMPHOCYTES	*10 <sup>9</sup> /L	2.629	1.327	0.803	6.420	24	11
MONOCYTES	*10 <sup>9</sup> /L	0.202	0.140	0.050	0.608	21	9
EOSINOPHILS	*10 <sup>9</sup> /L	0.199	0.129	0.040	0.504	18	7
BASOPHILS	*10 <sup>9</sup> /L	0.087	0.039	0.052	0.142	6	3
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.321	0.000	0.321	0.321	1	1
CALCIUM	mMol/L	2.65	0.20	2.23	3.05	26	12
PHOSPHORUS	mMol/L	1.81	0.26	1.36	2.36	26	12
SODIUM	mMol/L	134	4	126	146	23	12
POTASSIUM	mMol/L	4.0	0.6	3.1	5.9	26	12
CHLORIDE	mMol/L	97	3	92	105	25	11
BICARBONATE	mMol/L	24.3	3.5	21.0	28.0	3	1
CARBON DIOXIDE	mMol/L	23.5	2.1	20.0	25.0	6	5
IRON	µMol/L	42.07	7.518	31.15	48.87	4	3
BLOOD UREA NITROGEN	mMol/L	3.213	.7140	2.142	4.998	26	12
CREATININE	µMol/L	106	27	62	150	25	12
URIC ACID	mMol/L	0.012	0.000	0.012	0.018	7	5
TOTAL BILIRUBIN	µMol/L	15	7	5	29	24	11
DIRECT BILIRUBIN	µMol/L	3	3	0	9	6	3
INDIRECT BILIRUBIN	µMol/L	7	3	3	9	6	3
GLUCOSE	mMol/L	5.828	1.388	3.830	9.657	24	11
CHOLESTEROL	mMol/L	4.584	.9583	2.901	6.682	24	12
TRIGLYCERIDE	mMol/L	.5537	.3616	.1130	1.266	10	8
CREATINE PHOSPHOKINASE	U/L	274	97	145	473	16	5
LACTATE DEHYDROGENASE	U/L	856	694	278	3037	18	8
ALKALINE PHOSPHATASE	U/L	250	411	16	1760	25	12
ALANINE AMINOTRANSFERASE	U/L	18	5	10	28	20	11
ASPARTATE AMINOTRANSFERASE	U/L	118	31	61	209	25	12
GAMMA GLUTAMYLTRANSFERASE	U/L	11	6	4	22	15	10
AMYLASE	U/L	488.8	180.2	234.2	746.8	7	6
TOTAL PROTEIN (COLORIMETRY)	g/L	73	4	65	80	18	12
GLOBULIN (COLORIMETRY)	g/L	40	6	27	53	18	12
ALBUMIN (COLORIMETRY)	g/L	33	5	25	44	18	12
FIBRINOGEN	g/L	3.000	.0000	3.000	3.000	2	1
GAMMA GLOBULIN (ELECTROPHORESIS)	g/L	14	0	14	14	1	1
ALBUMIN (ELECTROPHORESIS)	g/L	44	0	44	44	1	1
ALPHA-1 GLOBULIN (ELECTROPHORESIS)	g/L	0.008	0.000	0.008	0.008	1	1
BETA GLOBULIN (ELECTROPHORESIS)	g/L	0.007	0.000	0.007	0.007	1	1
Body Temperature:	°C	36.8	0.4	36.0	37.0	9	7

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for females only, ages: 2 – 20 years**

Sample results submitted by 6 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	7.997	1.642	5.400	12.60	34	7
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	5.91	1.40	2.67	9.99	34	7
HEMOGLOBIN	g/L	107	20	52	150	33	7
HEMATOCRIT	L/L	0.321	0.056	0.223	0.441	35	7
MCV	fL	54.5	5.1	47.4	70.5	32	7
MCH	pg/cell	18.6	1.8	15.1	24.3	33	7
MCHC	g/L	342	16	302	363	32	7
PLATELET COUNT	*10 <sup>12</sup> /L	.2580	.0920	.1320	.4200	7	6
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	4.864	1.362	2.750	9.700	32	5
LYMPHOCYTES	*10 <sup>9</sup> /L	2.804	0.695	1.210	4.640	34	7
MONOCYTES	*10 <sup>9</sup> /L	0.267	0.183	0.000	0.658	27	7
EOSINOPHILS	*10 <sup>9</sup> /L	0.186	0.117	0.000	0.632	26	6
BASOPHILS	*10 <sup>9</sup> /L	0.055	0.042	0.000	0.099	9	2
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.031	0.048	0.000	0.094	6	2
CALCIUM	mMol/L	2.83	0.15	2.48	3.23	34	7
PHOSPHORUS	mMol/L	1.81	0.23	1.32	2.26	34	7
SODIUM	mMol/L	133	4	121	142	31	7
POTASSIUM	mMol/L	4.0	0.4	3.2	4.7	34	7
CHLORIDE	mMol/L	97	3	91	103	33	7
BICARBONATE	mMol/L	25.3	0.1	25.2	25.4	2	1
CARBON DIOXIDE	mMol/L	26.3	6.9	20.0	46.8	20	5
IRON	µMol/L	35.62	8.234	26.49	48.51	7	4
MAGNESIUM	mMol/L	0.872	0.000	0.872	0.872	1	1
BLOOD UREA NITROGEN	mMol/L	3.570	.7140	2.142	6.069	33	7
CREATININE	µMol/L	106	27	71	159	31	6
URIC ACID	mMol/L	0.018	0.018	0.000	0.071	10	4
TOTAL BILIRUBIN	µMol/L	15	5	9	31	32	7
DIRECT BILIRUBIN	µMol/L	2	2	0	7	8	3
INDIRECT BILIRUBIN	µMol/L	12	5	7	21	8	3
GLUCOSE	mMol/L	5.162	1.277	3.164	8.436	31	7
CHOLESTEROL	mMol/L	4.895	.8288	3.548	7.123	33	7
TRIGLYCERIDE	mMol/L	.5424	.1921	.3051	.8701	14	4
CREATINE PHOSPHOKINASE	U/L	199	84	69	383	25	4
LACTATE DEHYDROGENASE	U/L	992	1082	222	5235	29	4
ALKALINE PHOSPHATASE	U/L	282	215	77	1147	33	7
ALANINE AMINOTRANSFERASE	U/L	15	7	7	39	31	7
ASPARTATE AMINOTRANSFERASE	U/L	117	63	37	302	33	7
GAMMA GLUTAMYLTRANSFERASE	U/L	20	6	12	34	17	6
AMYLASE	U/L	454.2	273.8	200.7	862.8	10	4
TOTAL PROTEIN (COLORIMETRY)	g/L	74	7	64	88	23	7
GLOBULIN (COLORIMETRY)	g/L	41	7	26	51	22	6
ALBUMIN (COLORIMETRY)	g/L	33	6	24	44	22	6
FIBRINOGEN	g/L	.7200	1.010	.0000	1.430	2	2
GAMMA GLOBULIN (ELECTROPHORESIS)	g/L	14	4	11	16	2	1
ALBUMIN (ELECTROPHORESIS)	g/L	44	5	41	47	2	1
ALPHA-1 GLOBULIN (ELECTROPHORESIS)	g/L	0.002	0.002	0.001	0.004	2	1
BETA GLOBULIN (ELECTROPHORESIS)	g/L	0.010	0.000	0.010	0.010	2	1
TOCOPHEROL	nMol/L	.1160	.0000	.1160	.1160	1	1
Body Temperature:	°C	36.9	0.4	36.0	37.0	7	2

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for both sexes combined, ages: 2 – 20 years**

Sample results submitted by 9 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	7.488	1.865	4.000	13.00	58	17
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	6.22	1.19	3.19	9.99	58	16
HEMOGLOBIN	g/L	110	18	58	164	58	17
HEMATOCRIT	L/L	0.324	0.053	0.220	0.444	62	16
MCV	fL	52.8	4.7	46.8	70.5	57	16
MCH	pg/cell	18.2	1.7	14.5	24.3	57	16
MCHC	g/L	345	19	276	377	57	16
PLATELET COUNT	*10 <sup>12</sup> /L	.2630	.0800	.1320	.4200	12	10
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	4.451	1.368	1.900	9.700	54	13
LYMPHOCYTES	*10 <sup>9</sup> /L	2.732	0.999	0.803	6.420	58	17
MONOCYTES	*10 <sup>9</sup> /L	0.238	0.167	0.000	0.658	48	16
EOSINOPHILS	*10 <sup>9</sup> /L	0.191	0.121	0.000	0.632	44	13
BASOPHILS	*10 <sup>9</sup> /L	0.068	0.043	0.000	0.142	15	5
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.072	0.118	0.000	0.321	7	3
CALCIUM	mMol/L	2.78	0.18	2.43	3.23	59	17
PHOSPHORUS	mMol/L	1.81	0.26	1.32	2.36	60	17
SODIUM	mMol/L	134	4	126	146	53	17
POTASSIUM	mMol/L	4.0	0.4	3.1	5.0	59	17
CHLORIDE	mMol/L	97	3	91	105	58	16
BICARBONATE	mMol/L	24.7	2.5	21.0	28.0	5	2
CARBON DIOXIDE	mMol/L	24.8	4.6	20.0	44.7	25	10
IRON	µMol/L	37.95	8.234	26.49	48.87	11	7
MAGNESIUM	mMol/L	0.872	0.000	0.872	0.872	1	1
BLOOD UREA NITROGEN	mMol/L	3.570	.7140	2.142	6.069	59	17
CREATININE	µMol/L	106	27	62	159	56	16
URIC ACID	mMol/L	0.012	0.006	0.000	0.024	16	9
TOTAL BILIRUBIN	µMol/L	15	7	5	31	56	16
DIRECT BILIRUBIN	µMol/L	3	3	0	9	14	6
INDIRECT BILIRUBIN	µMol/L	10	5	3	21	14	6
GLUCOSE	mMol/L	5.439	1.388	3.164	9.657	55	17
CHOLESTEROL	mMol/L	4.766	.8806	2.901	7.123	57	17
TRIGLYCERIDE	mMol/L	.5537	.2712	.1130	1.266	24	10
CREATINE PHOSPHOKINASE	U/L	228	95	69	473	41	9
LACTATE DEHYDROGENASE	U/L	939	946	222	5235	47	12
ALKALINE PHOSPHATASE	U/L	268	312	16	1760	58	17
ALANINE AMINOTRANSFERASE	U/L	16	6	7	39	51	16
ASPARTATE AMINOTRANSFERASE	U/L	117	52	37	302	58	17
GAMMA GLUTAMYLTRANSFERASE	U/L	16	7	4	34	32	14
AMYLASE	U/L	468.4	233.8	200.7	862.8	17	9
TOTAL PROTEIN (COLORIMETRY)	g/L	74	6	64	88	41	17
GLOBULIN (COLORIMETRY)	g/L	41	7	26	53	40	16
ALBUMIN (COLORIMETRY)	g/L	33	6	24	44	40	16
FIBRINOGEN	g/L	1.860	1.440	.0000	3.000	4	3
GAMMA GLOBULIN (ELECTROPHORESIS)	g/L	14	3	11	16	3	2
ALBUMIN (ELECTROPHORESIS)	g/L	44	3	41	47	3	2
ALPHA-1 GLOBULIN (ELECTROPHORESIS)	g/L	0.004	0.003	0.001	0.008	3	2
BETA GLOBULIN (ELECTROPHORESIS)	g/L	0.009	0.002	0.007	0.010	3	2
TOCOPHEROL	nMol/L	.1160	.0000	.1160	.1160	1	1
Body Temperature:	°C	36.8	0.4	36.0	37.0	16	8

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for males only, ages: > 20 years**

Sample results submitted by 1 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	5.600	0.000	5.600	5.600	1	1
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	5.53	0.00	5.53	5.53	1	1
HEMOGLOBIN	g/L	107	0	107	107	1	1
HEMATOCRIT	L/L	0.300	0.000	0.300	0.300	1	1
MCV	fL	54.2	0.0	54.2	54.2	1	1
MCH	pg/cell	19.3	0.0	19.3	19.3	1	1
MCHC	g/L	357	0	357	357	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	4.140	0.000	4.140	4.140	1	1
LYMPHOCYTES	*10 <sup>9</sup> /L	1.120	0.000	1.120	1.120	1	1
MONOCYTES	*10 <sup>9</sup> /L	0.112	0.000	0.112	0.112	1	1
EOSINOPHILS	*10 <sup>9</sup> /L	0.224	0.000	0.224	0.224	1	1
CALCIUM	mMol/L	2.78	0.00	2.78	2.78	1	1
PHOSPHORUS	mMol/L	1.97	0.00	1.97	1.97	1	1
SODIUM	mMol/L	133	0	133	133	1	1
POTASSIUM	mMol/L	4.0	0.0	4.0	4.0	1	1
CHLORIDE	mMol/L	99	0	99	99	1	1
CARBON DIOXIDE	mMol/L	25.0	0.0	25.0	25.0	1	1
IRON	μMol/L	31.15	.0000	31.15	31.15	1	1
BLOOD UREA NITROGEN	mMol/L	2.142	.0000	2.142	2.142	1	1
CREATININE	μMol/L	106	0	106	106	1	1
URIC ACID	mMol/L	0.012	0.000	0.012	0.012	1	1
TOTAL BILIRUBIN	μMol/L	10	0	10	10	1	1
DIRECT BILIRUBIN	μMol/L	3	0	3	3	1	1
INDIRECT BILIRUBIN	μMol/L	7	0	7	7	1	1
GLUCOSE	mMol/L	5.661	.0000	5.661	5.661	1	1
CHOLESTEROL	mMol/L	4.584	.0000	4.584	4.584	1	1
TRIGLYCERIDE	mMol/L	.6328	.0000	.6328	.6328	1	1
CREATINE PHOSPHOKINASE	U/L	199	0	199	199	1	1
LACTATE DEHYDROGENASE	U/L	1355	0	1355	1355	1	1
ALKALINE PHOSPHATASE	U/L	100	0	100	100	1	1
ALANINE AMINOTRANSFERASE	U/L	22	0	22	22	1	1
ASPARTATE AMINOTRANSFERASE	U/L	137	0	137	137	1	1
GAMMA GLUTAMYLTRANSFERASE	U/L	33	0	33	33	1	1
AMYLASE	U/L	808.1	.0000	808.1	808.1	1	1
TOTAL PROTEIN (COLORIMETRY)	g/L	70	0	70	70	1	1
GLOBULIN (COLORIMETRY)	g/L	47	0	47	47	1	1
ALBUMIN (COLORIMETRY)	g/L	23	0	23	23	1	1
GAMMA GLOBULIN (ELECTROPHORESIS)	g/L	13	0	13	13	1	1
ALBUMIN (ELECTROPHORESIS)	g/L	38	0	38	38	1	1
ALPHA-1 GLOBULIN (ELECTROPHORESIS)	g/L	0.001	0.000	0.001	0.001	1	1
BETA GLOBULIN (ELECTROPHORESIS)	g/L	0.010	0.000	0.010	0.010	1	1

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for females only, ages: > 20 years**

Sample results submitted by 1 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	7.325	0.299	7.000	7.700	4	2
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	4.95	0.16	4.82	5.18	4	2
HEMOGLOBIN	g/L	91	3	87	93	4	2
HEMATOCRIT	L/L	0.281	0.010	0.269	0.290	6	2
MCV	fL	56.4	1.8	55.4	59.1	4	2
MCH	pg/cell	18.4	0.5	17.9	18.9	4	2
MCHC	g/L	326	8	321	338	4	2
NUCLEATED RED BLOOD CELLS	/100 WBC	0	0	0	0	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	4.115	0.832	3.390	5.030	4	2
LYMPHOCYTES	*10 <sup>9</sup> /L	2.778	1.053	1.730	4.080	4	2
MONOCYTES	*10 <sup>9</sup> /L	0.236	0.187	0.074	0.504	4	2
EOSINOPHILS	*10 <sup>9</sup> /L	0.163	0.065	0.077	0.216	4	2
BASOPHILS	*10 <sup>9</sup> /L	0.144	0.000	0.144	0.144	1	1
CALCIUM	mMol/L	2.85	0.05	2.80	2.90	4	2
PHOSPHORUS	mMol/L	1.65	0.23	1.39	1.91	4	2
SODIUM	mMol/L	135	1	133	136	4	2
POTASSIUM	mMol/L	4.2	0.5	3.7	4.7	4	2
CHLORIDE	mMol/L	100	3	98	105	4	2
CARBON DIOXIDE	mMol/L	23.7	2.3	21.0	25.0	3	1
IRON	µMol/L	44.03	.0000	44.03	44.03	1	1
BLOOD UREA NITROGEN	mMol/L	3.213	.7140	2.856	3.927	4	2
CREATININE	µMol/L	106	27	88	141	4	2
URIC ACID	mMol/L	0.018	0.006	0.012	0.024	4	2
TOTAL BILIRUBIN	µMol/L	12	2	9	14	4	2
DIRECT BILIRUBIN	µMol/L	3	0	3	3	3	1
INDIRECT BILIRUBIN	µMol/L	9	2	7	10	3	1
GLUCOSE	mMol/L	4.218	.8880	2.942	5.051	4	2
CHOLESTEROL	mMol/L	6.190	.9583	4.973	7.174	4	2
TRIGLYCERIDE	mMol/L	.4407	.1695	.2147	.5763	4	2
CREATINE PHOSPHOKINASE	U/L	207	78	157	297	3	1
LACTATE DEHYDROGENASE	U/L	1008	495	266	1287	4	2
ALKALINE PHOSPHATASE	U/L	265	80	145	312	4	2
ALANINE AMINOTRANSFERASE	U/L	15	4	9	18	4	2
ASPARTATE AMINOTRANSFERASE	U/L	101	6	91	104	4	2
GAMMA GLUTAMYLTRANSFERASE	U/L	32	3	29	35	3	1
AMYLASE	U/L	524.1	225.5	305.6	755.9	3	1
TOTAL PROTEIN (COLORIMETRY)	g/L	71	2	68	72	3	1
GLOBULIN (COLORIMETRY)	g/L	45	4	42	49	3	1
ALBUMIN (COLORIMETRY)	g/L	26	3	23	28	3	1
GAMMA GLOBULIN (ELECTROPHORESIS)	g/L	15	0	15	15	1	1
ALBUMIN (ELECTROPHORESIS)	g/L	39	0	39	39	1	1
ALPHA-1 GLOBULIN (ELECTROPHORESIS)	g/L	0.003	0.000	0.003	0.003	1	1
BETA GLOBULIN (ELECTROPHORESIS)	g/L	0.010	0.000	0.010	0.010	1	1

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.



**Physiological reference ranges calculated for both sexes combined, ages: > 20 years**

Sample results submitted by 1 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	6.980	0.814	5.600	7.700	5	3
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	5.06	0.30	4.82	5.53	5	3
HEMOGLOBIN	g/L	94	8	87	107	5	3
HEMATOCRIT	L/L	0.284	0.011	0.269	0.300	7	3
MCV	fL	56.0	1.8	54.2	59.1	5	3
MCH	pg/cell	18.6	0.6	17.9	19.3	5	3
MCHC	g/L	332	15	321	357	5	3
NUCLEATED RED BLOOD CELLS	/100 WBC	0	0	0	0	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	4.120	0.721	3.390	5.030	5	3
LYMPHOCYTES	*10 <sup>9</sup> /L	2.446	1.175	1.120	4.080	5	3
MONOCYTES	*10 <sup>9</sup> /L	0.211	0.172	0.074	0.504	5	3
EOSINOPHILS	*10 <sup>9</sup> /L	0.175	0.063	0.077	0.224	5	3
BASOPHILS	*10 <sup>9</sup> /L	0.144	0.000	0.144	0.144	1	1
CALCIUM	mMol/L	2.83	0.05	2.78	2.90	5	3
PHOSPHORUS	mMol/L	1.71	0.23	1.39	1.97	5	3
SODIUM	mMol/L	134	1	133	136	5	3
POTASSIUM	mMol/L	4.2	0.4	3.7	4.7	5	3
CHLORIDE	mMol/L	100	3	98	105	5	3
CARBON DIOXIDE	mMol/L	24.0	2.0	21.0	25.0	4	2
IRON	µMol/L	37.59	9.129	31.15	44.03	2	2
BLOOD UREA NITROGEN	mMol/L	2.856	.7140	2.142	3.927	5	3
CREATININE	µMol/L	106	18	88	141	5	3
URIC ACID	mMol/L	0.012	0.006	0.012	0.024	5	3
TOTAL BILIRUBIN	µMol/L	10	2	9	14	5	3
DIRECT BILIRUBIN	µMol/L	3	0	3	3	4	2
INDIRECT BILIRUBIN	µMol/L	9	2	7	10	4	2
GLUCOSE	mMol/L	4.496	.9990	2.942	5.661	5	3
CHOLESTEROL	mMol/L	5.853	1.114	4.584	7.174	5	3
TRIGLYCERIDE	mMol/L	.4746	.1695	.2147	.6328	5	3
CREATINE PHOSPHOKINASE	U/L	205	64	157	297	4	2
LACTATE DEHYDROGENASE	U/L	1077	456	266	1355	5	3
ALKALINE PHOSPHATASE	U/L	232	101	100	312	5	3
ALANINE AMINOTRANSFERASE	U/L	16	5	9	22	5	3
ASPARTATE AMINOTRANSFERASE	U/L	108	17	91	137	5	3
GAMMA GLUTAMYLTRANSFERASE	U/L	33	3	29	35	4	2
AMYLASE	U/L	595.1	232.4	305.6	808.1	4	2
TOTAL PROTEIN (COLORIMETRY)	g/L	71	2	68	72	4	2
GLOBULIN (COLORIMETRY)	g/L	46	3	42	49	4	2
ALBUMIN (COLORIMETRY)	g/L	25	2	23	28	4	2
GAMMA GLOBULIN (ELECTROPHORESIS)	g/L	14	1	13	15	2	2
ALBUMIN (ELECTROPHORESIS)	g/L	38	1	38	39	2	2
ALPHA-1 GLOBULIN (ELECTROPHORESIS)	g/L	0.002	0.001	0.001	0.003	2	2
BETA GLOBULIN (ELECTROPHORESIS)	g/L	0.010	0.000	0.010	0.010	2	2

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for males only, all ages combined**

Sample results submitted by 8 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	8.003	2.663	4.000	14.50	43	18
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	6.94	1.23	4.52	9.96	42	18
HEMOGLOBIN	g/L	114	15	80	164	42	18
HEMATOCRIT	L/L	0.331	0.047	0.220	0.444	46	18
MCV	fL	48.3	5.6	35.4	59.1	42	18
MCH	pg/cell	16.7	2.1	12.2	20.5	42	18
MCHC	g/L	346	22	276	379	42	18
PLATELET COUNT	*10 <sup>12</sup> /L	.2540	.1300	.0950	.4840	8	7
NUCLEATED RED BLOOD CELLS	/100 WBC	0	0	0	0	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	4.678	2.021	1.900	11.50	41	16
LYMPHOCYTES	*10 <sup>9</sup> /L	2.982	1.449	0.803	6.420	43	18
MONOCYTES	*10 <sup>9</sup> /L	0.271	0.209	0.050	0.858	33	16
EOSINOPHILS	*10 <sup>9</sup> /L	0.198	0.121	0.040	0.504	30	14
BASOPHILS	*10 <sup>9</sup> /L	0.087	0.039	0.052	0.142	6	3
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.708	0.773	0.100	1.830	4	3
CALCIUM	mMol/L	2.68	0.20	2.23	3.15	40	19
PHOSPHORUS	mMol/L	1.91	0.32	1.36	2.71	38	18
SODIUM	mMol/L	134	5	126	146	35	19
POTASSIUM	mMol/L	4.0	0.6	3.1	5.9	39	19
CHLORIDE	mMol/L	98	4	92	108	38	18
BICARBONATE	mMol/L	24.3	3.5	21.0	28.0	3	1
CARBON DIOXIDE	mMol/L	22.5	3.4	16.0	27.0	13	10
OSMOLARITY	Osmol/L	.2640	.0000	.2640	.2640	1	1
IRON	µMol/L	34.37	11.81	13.78	48.87	8	5
BLOOD UREA NITROGEN	mMol/L	3.213	.7140	2.142	5.355	40	19
CREATININE	µMol/L	106	35	53	230	38	19
URIC ACID	mMol/L	0.012	0.006	0.000	0.030	16	10
TOTAL BILIRUBIN	µMol/L	15	7	5	29	37	19
DIRECT BILIRUBIN	µMol/L	3	3	0	9	8	4
INDIRECT BILIRUBIN	µMol/L	7	2	3	10	8	4
GLUCOSE	mMol/L	5.661	1.277	3.830	9.657	37	18
CHOLESTEROL	mMol/L	4.481	1.140	2.202	6.682	37	18
TRIGLYCERIDE	mMol/L	.5198	.2825	.1130	1.266	21	13
CREATINE PHOSPHOKINASE	U/L	269	89	145	473	20	8
LACTATE DEHYDROGENASE	U/L	939	671	278	3037	29	13
ALKALINE PHOSPHATASE	U/L	296	401	16	1760	38	19
ALANINE AMINOTRANSFERASE	U/L	15	6	6	28	33	18
ASPARTATE AMINOTRANSFERASE	U/L	110	35	37	209	39	19
GAMMA GLUTAMYLTRANSFERASE	U/L	17	17	4	94	26	15
AMYLASE	U/L	391.3	222.0	85.29	808.1	15	10
TOTAL PROTEIN (COLORIMETRY)	g/L	68	11	39	80	32	19
GLOBULIN (COLORIMETRY)	g/L	39	8	17	53	31	19
ALBUMIN (COLORIMETRY)	g/L	30	7	18	44	31	19
FIBRINOGEN	g/L	3.000	.0000	3.000	3.000	2	1
GAMMA GLOBULIN (ELECTROPHORESIS)	g/L	14	0	0	13	14	2 1
ALBUMIN (ELECTROPHORESIS)	g/L	41	4	38	44	2	1
ALPHA-1 GLOBULIN (ELECTROPHORESIS)	g/L	0.004	0.005	0.001	0.001	0.008	2 1
BETA GLOBULIN (ELECTROPHORESIS)	g/L	0.009	0.002	0.007	0.007	0.010	2 1
Body Temperature:	°C	36.8	0.4	36.0	37.0	11	8

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for females only, all ages combined**

Sample results submitted by 6 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	8.212	1.727	5.400	12.70	43	11
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	5.98	1.31	3.19	9.99	42	11
HEMOGLOBIN	g/L	105	19	52	150	42	11
HEMATOCRIT	L/L	0.315	0.054	0.200	0.441	47	11
MCV	fL	53.9	5.3	39.4	70.5	41	11
MCH	pg/cell	18.3	1.8	13.9	24.3	41	11
MCHC	g/L	341	16	302	370	41	11
PLATELET COUNT	*10 <sup>12</sup> /L	.2580	.0920	.1320	.4200	7	6
NUCLEATED RED BLOOD CELLS	/100 WBC	0	0	0	0	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	4.848	1.328	2.750	9.700	41	9
LYMPHOCYTES	*10 <sup>9</sup> /L	2.978	1.137	1.210	7.750	43	11
MONOCYTES	*10 <sup>9</sup> /L	0.272	0.187	0.000	0.700	36	11
EOSINOPHILS	*10 <sup>9</sup> /L	0.188	0.108	0.000	0.632	33	9
BASOPHILS	*10 <sup>9</sup> /L	0.083	0.070	0.000	0.254	12	4
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.114	0.214	0.000	0.630	8	4
CALCIUM	mMol/L	2.83	0.15	2.48	3.23	42	11
PHOSPHORUS	mMol/L	1.81	0.26	1.32	2.26	41	10
SODIUM	mMol/L	134	4	121	142	38	11
POTASSIUM	mMol/L	4.0	0.4	3.2	4.7	42	11
CHLORIDE	mMol/L	97	3	91	105	40	11
BICARBONATE	mMol/L	25.3	0.1	25.2	25.4	2	1
CARBON DIOXIDE	mMol/L	24.6	4.8	20.0	44.7	24	7
IRON	µMol/L	36.70	8.234	26.49	48.51	8	4
MAGNESIUM	mMol/L	0.872	0.000	0.872	0.872	1	1
BLOOD UREA NITROGEN	mMol/L	3.570	.7140	2.142	6.069	41	11
CREATININE	µMol/L	106	27	71	159	38	10
URIC ACID	mMol/L	0.012	0.006	0.000	0.030	15	7
TOTAL BILIRUBIN	µMol/L	15	5	9	31	39	11
DIRECT BILIRUBIN	µMol/L	2	2	0	7	13	5
INDIRECT BILIRUBIN	µMol/L	10	3	5	21	13	5
GLUCOSE	mMol/L	5.051	1.388	2.109	8.436	39	11
CHOLESTEROL	mMol/L	4.973	.9583	3.263	7.174	41	11
TRIGLYCERIDE	mMol/L	.5424	.2373	.2147	1.175	21	8
CREATINE PHOSPHOKINASE	U/L	195	79	69	383	32	7
LACTATE DEHYDROGENASE	U/L	1023	1007	222	5235	36	8
ALKALINE PHOSPHATASE	U/L	302	285	77	1589	41	11
ALANINE AMINOTRANSFERASE	U/L	16	7	7	39	39	11
ASPARTATE AMINOTRANSFERASE	U/L	114	58	37	302	41	11
GAMMA GLUTAMYLTRANSFERASE	U/L	23	10	12	58	23	8
AMYLASE	U/L	486.6	241.2	200.7	862.8	15	6
TOTAL PROTEIN (COLORIMETRY)	g/L	73	7	55	88	28	9
GLOBULIN (COLORIMETRY)	g/L	41	7	26	51	27	8
ALBUMIN (COLORIMETRY)	g/L	32	7	19	44	27	8
FIBRINOGEN	g/L	.4800	.8200	.0000	1.430	3	2
GAMMA GLOBULIN (ELECTROPHORESIS)	g/L	14	3	11	16	3	2
ALBUMIN (ELECTROPHORESIS)	g/L	42	4	39	47	3	2
ALPHA-1 GLOBULIN (ELECTROPHORESIS)	g/L	0.003	0.001	0.001	0.004	3	2
BETA GLOBULIN (ELECTROPHORESIS)	g/L	0.010	0.000	0.010	0.010	3	2
TOCOPHEROL	nMol/L	.1160	.0000	.1160	.1160	1	1
Body Temperature:	°C	36.9	0.4	36.0	37.0	7	2

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for both sexes combined, all ages combined**

Sample results submitted by 10 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	8.107	2.234	4.000	14.50	86	28
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	6.46	1.35	3.19	9.99	84	27
HEMOGLOBIN	g/L	110	18	58	164	84	28
HEMATOCRIT	L/L	0.323	0.051	0.200	0.444	93	27
MCV	fL	51.0	6.1	35.4	70.5	83	27
MCH	pg/cell	17.5	2.2	12.2	24.3	83	27
MCHC	g/L	343	19	276	379	83	27
PLATELET COUNT	*10 <sup>12</sup> /L	.2560	.1100	.0950	.4840	15	13
NUCLEATED RED BLOOD CELLS	/100 WBC	0	0	0	0	2	2
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	4.763	1.702	1.900	11.50	82	24
LYMPHOCYTES	*10 <sup>9</sup> /L	2.980	1.295	0.803	7.750	86	28
MONOCYTES	*10 <sup>9</sup> /L	0.272	0.196	0.000	0.858	69	27
EOSINOPHILS	*10 <sup>9</sup> /L	0.193	0.114	0.000	0.632	63	23
BASOPHILS	*10 <sup>9</sup> /L	0.084	0.061	0.000	0.254	18	7
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.312	0.527	0.000	1.830	12	7
CALCIUM	mMol/L	2.75	0.20	2.23	3.23	82	28
PHOSPHORUS	mMol/L	1.84	0.29	1.32	2.71	79	26
SODIUM	mMol/L	134	4	121	146	73	28
POTASSIUM	mMol/L	4.0	0.4	3.1	5.3	80	28
CHLORIDE	mMol/L	97	3	91	108	78	27
BICARBONATE	mMol/L	24.7	2.5	21.0	28.0	5	2
CARBON DIOXIDE	mMol/L	23.3	2.7	16.0	28.0	36	16
OSMOLARITY	Osmol/L	.2640	.0000	.2640	.2640	1	1
IRON	µMol/L	35.62	9.845	13.78	48.87	16	9
MAGNESIUM	mMol/L	0.872	0.000	0.872	0.872	1	1
BLOOD UREA NITROGEN	mMol/L	3.570	.7140	2.142	6.069	81	28
CREATININE	µMol/L	106	27	53	230	76	27
URIC ACID	mMol/L	0.018	0.012	0.000	0.071	32	17
TOTAL BILIRUBIN	µMol/L	15	5	5	31	76	28
DIRECT BILIRUBIN	µMol/L	3	2	0	9	21	9
INDIRECT BILIRUBIN	µMol/L	9	3	3	21	21	9
GLUCOSE	mMol/L	5.439	1.332	2.942	9.657	75	27
CHOLESTEROL	mMol/L	4.817	.9842	2.694	7.174	76	26
TRIGLYCERIDE	mMol/L	.5311	.2599	.1130	1.266	42	19
CREATINE PHOSPHOKINASE	U/L	224	90	69	473	52	15
LACTATE DEHYDROGENASE	U/L	986	868	222	5235	65	21
ALKALINE PHOSPHATASE	U/L	299	343	16	1760	79	28
ALANINE AMINOTRANSFERASE	U/L	16	6	6	39	72	27
ASPARTATE AMINOTRANSFERASE	U/L	112	48	37	302	80	28
GAMMA GLUTAMYLTRANSFERASE	U/L	20	14	4	94	49	21
AMYLASE	U/L	438.8	232.9	85.29	862.8	30	15
TOTAL PROTEIN (COLORIMETRY)	g/L	70	9	41	88	60	26
GLOBULIN (COLORIMETRY)	g/L	40	7	24	53	57	25
ALBUMIN (COLORIMETRY)	g/L	31	7	18	44	57	25
FIBRINOGEN	g/L	1.490	1.500	.0000	3.000	5	3
GAMMA GLOBULIN (ELECTROPHORESIS)	g/L	14	2	11	16	5	3
ALBUMIN (ELECTROPHORESIS)	g/L	42	4	38	47	5	3
ALPHA-1 GLOBULIN (ELECTROPHORESIS)	g/L	0.003	0.003	0.001	0.008	5	3
BETA GLOBULIN (ELECTROPHORESIS)	g/L	0.010	0.001	0.007	0.010	5	3
TOCOPHEROL	nMol/L	.1160	.0000	.1160	.1160	1	1
Body Temperature:	°C	36.8	0.4	36.0	37.0	18	9

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Average weights calculated for males only**

Weights submitted by ISIS member institutions.

<b>Age Grouping</b>	<b>Units</b>	<b>Mean</b>	<b>St. Dev.</b>	<b>Minimum Value</b>	<b>Maximum Value</b>	<b>Sample Size<sup>a</sup></b>	<b>Animals<sup>b</sup></b>
0-1 days	Kg	10.77	2.12	8.500	14.09	10	9
1.8-2.2 months	Kg	24.46	0.56	23.82	25.05	6	1

<sup>a</sup> Number of samples used to calculate the reference range.<sup>b</sup> Number of different individuals contributing to the reference values.**Average weights calculated for both sexes combined**

Weights submitted by ISIS member institutions.

<b>Age Grouping</b>	<b>Units</b>	<b>Mean</b>	<b>St. Dev.</b>	<b>Minimum Value</b>	<b>Maximum Value</b>	<b>Sample Size<sup>a</sup></b>	<b>Animals<sup>b</sup></b>
0-1 days	Kg	11.06	2.21	8.500	14.55	12	11
1.8-2.2 months	Kg	24.46	0.56	23.82	25.05	6	1
14.5-15.5 years	Kg	262.3	2.6	258.8	265.6	6	2

<sup>a</sup> Number of samples used to calculate the reference range.<sup>b</sup> Number of different individuals contributing to the reference values.

# **Normal Physiological Values for Malayan Tapir *Tapirus Indicus***

International Species Information System

2002

**Physiological reference ranges calculated for males only ages: < 8 days**

Sample results submitted by 2 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	7.170	0.000	7.170	7.170	1	1
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	7.25	0.00	7.25	7.25	1	1
HEMOGLOBIN	g/L	118	0	118	118	1	1
HEMATOCRIT	L/L	0.310	0.000	0.310	0.310	1	1
MCV	fL	42.8	0.0	42.8	42.8	1	1
MCH	pg/cell	16.3	0.0	16.3	16.3	1	1
MCHC	g/L	381	0	381	381	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	5.460	0.000	5.460	5.460	1	1
LYMPHOCYTES	*10 <sup>9</sup> /L	1.150	0.000	1.150	1.150	1	1
MONOCYTES	*10 <sup>9</sup> /L	0.287	0.000	0.287	0.287	1	1
EOSINOPHILS	*10 <sup>9</sup> /L	0.287	0.000	0.287	0.287	1	1
CALCIUM	mMol/L	3.08	0.00	3.08	3.08	1	1
BLOOD UREA NITROGEN	mMol/L	6.783	.0000	6.783	6.783	1	1
CREATININE	µMol/L	44	0	44	44	1	1
URIC ACID	mMol/L	0.065	0.000	0.065	0.065	1	1
TOTAL BILIRUBIN	µMol/L	15	0	15	15	1	1
GLUCOSE	mMol/L	7.604	.2220	7.437	7.715	2	2
CHOLESTEROL	mMol/L	4.558	.0000	4.558	4.558	1	1
TRIGLYCERIDE	mMol/L	.8362	.0000	.8362	.8362	1	1
ALANINE AMINOTRANSFERASE	U/L	33	0	33	33	1	1
ASPARTATE AMINOTRANSFERASE	U/L	204	0	204	204	1	1
GAMMA GLUTAMYLTRANSFERASE	U/L	254	0	254	254	1	1
TOTAL PROTEIN (COLORIMETRY)	g/L	61	0	61	61	1	1

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for females only ages: < 8 days**

Sample results submitted by 5 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	9.640	4.306	2.400	13.80	5	5
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	7.18	0.89	5.70	7.99	5	5
HEMOGLOBIN	g/L	95	16	73	111	4	4
HEMATOCRIT	L/L	0.284	0.051	0.210	0.348	5	5
MCV	fL	39.4	4.5	33.8	45.1	5	5
MCH	pg/cell	13.6	0.8	12.8	14.4	4	4
MCHC	g/L	334	26	306	364	4	4
PLATELET COUNT	*10 <sup>12</sup> /L	.2170	.0000	.2170	.2170	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	6.886	4.172	0.768	12.10	5	5
LYMPHOCYTES	*10 <sup>9</sup> /L	2.228	1.171	1.380	4.140	5	5
MONOCYTES	*10 <sup>9</sup> /L	0.108	0.027	0.072	0.138	4	4
EOSINOPHILS	*10 <sup>9</sup> /L	0.096	0.050	0.024	0.138	4	4
BASOPHILS	*10 <sup>9</sup> /L	0.094	0.030	0.072	0.115	2	2
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	1.580	0.000	1.580	1.580	1	1
CALCIUM	mMol/L	2.83	0.23	2.53	3.00	4	4
PHOSPHORUS	mMol/L	1.62	0.36	1.42	2.16	4	4
SODIUM	mMol/L	138	8	131	148	4	4
POTASSIUM	mMol/L	4.4	0.6	3.7	5.1	4	4
CHLORIDE	mMol/L	97	7	90	106	4	4
CARBON DIOXIDE	mMol/L	25.0	4.2	22.0	28.0	2	2
BLOOD UREA NITROGEN	mMol/L	5.712	4.641	1.785	12.14	4	4
CREATININE	μMol/L	80	18	53	97	4	4
TOTAL BILIRUBIN	μMol/L	19	5	12	26	4	4
DIRECT BILIRUBIN	μMol/L	3	2	2	3	2	2
INDIRECT BILIRUBIN	μMol/L	15	3	12	17	2	2
GLUCOSE	mMol/L	7.604	.8325	6.827	8.436	4	4
CHOLESTEROL	mMol/L	3.626	1.554	2.486	5.387	3	3
CREATINE PHOSPHOKINASE	U/L	272	207	125	418	2	2
ALKALINE PHOSPHATASE	U/L	1085	419	725	1640	4	4
ALANINE AMINOTRANSFERASE	U/L	9	2	8	11	3	3
ASPARTATE AMINOTRANSFERASE	U/L	110	24	95	145	4	4
GAMMA GLUTAMYLTRANSFERASE	U/L	143	0	143	143	1	1
AMYLASE	U/L	101.2	.0000	101.2	101.2	1	1
TOTAL PROTEIN (COLORIMETRY)	g/L	67	6	60	73	4	4
GLOBULIN (COLORIMETRY)	g/L	48	10	36	54	3	3
ALBUMIN (COLORIMETRY)	g/L	20	3	18	24	3	3
FIBRINOGEN	g/L	2.500	.7100	2.000	3.000	2	2

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.



**Physiological reference ranges calculated for both sexes combined ages: < 8 days**

Sample results submitted by 5 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	9.228	3.981	2.400	13.80	6	6
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	7.19	0.79	5.70	7.99	6	6
HEMOGLOBIN	g/L	100	17	73	118	5	5
HEMATOCRIT	L/L	0.288	0.047	0.210	0.348	6	6
MCV	fL	40.0	4.3	33.8	45.1	6	6
MCH	pg/cell	14.1	1.4	12.8	16.3	5	5
MCHC	g/L	344	31	306	381	5	5
PLATELET COUNT	*10 <sup>12</sup> /L	.2170	.0000	.2170	.2170	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	6.648	3.776	0.768	12.10	6	6
LYMPHOCYTES	*10 <sup>9</sup> /L	2.048	1.136	1.150	4.140	6	6
MONOCYTES	*10 <sup>9</sup> /L	0.144	0.084	0.072	0.287	5	5
EOSINOPHILS	*10 <sup>9</sup> /L	0.134	0.096	0.024	0.287	5	5
BASOPHILS	*10 <sup>9</sup> /L	0.094	0.030	0.072	0.115	2	2
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	1.580	0.000	1.580	1.580	1	1
CALCIUM	mMol/L	2.88	0.23	2.53	3.08	5	5
PHOSPHORUS	mMol/L	1.62	0.36	1.42	2.16	4	4
SODIUM	mMol/L	138	8	131	148	4	4
POTASSIUM	mMol/L	4.4	0.6	3.7	5.1	4	4
CHLORIDE	mMol/L	97	7	90	106	4	4
CARBON DIOXIDE	mMol/L	25.0	4.2	22.0	28.0	2	2
BLOOD UREA NITROGEN	mMol/L	5.712	3.927	1.785	12.14	5	5
CREATININE	μMol/L	71	18	44	97	5	5
URIC ACID	mMol/L	0.065	0.000	0.065	0.065	1	1
TOTAL BILIRUBIN	μMol/L	17	5	12	26	5	5
DIRECT BILIRUBIN	μMol/L	3	2	2	3	2	2
INDIRECT BILIRUBIN	μMol/L	15	3	12	17	2	2
GLUCOSE	mMol/L	7.604	.6660	6.827	8.436	6	6
CHOLESTEROL	mMol/L	3.859	1.347	2.486	5.387	4	4
TRIGLYCERIDE	mMol/L	.8362	.0000	.8362	.8362	1	1
CREATINE PHOSPHOKINASE	U/L	272	207	125	418	2	2
ALKALINE PHOSPHATASE	U/L	1085	419	725	1640	4	4
ALANINE AMINOTRANSFERASE	U/L	15	12	8	33	4	4
ASPARTATE AMINOTRANSFERASE	U/L	128	47	95	204	5	5
GAMMA GLUTAMYLTRANSFERASE	U/L	199	78	143	254	2	2
AMYLASE	U/L	101.2	.0000	101.2	101.2	1	1
TOTAL PROTEIN (COLORIMETRY)	g/L	65	6	60	73	5	5
GLOBULIN (COLORIMETRY)	g/L	48	10	36	54	3	3
ALBUMIN (COLORIMETRY)	g/L	20	3	18	24	3	3
FIBRINOGEN	g/L	2.500	.7100	2.000	3.000	2	2

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for males only, ages: 8 days – 2 years**

Sample results submitted by 3 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	13.48	6.954	7.200	20.50	4	3
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	7.72	0.16	7.54	7.85	3	2
HEMOGLOBIN	g/L	110	15	101	127	3	2
HEMATOCRIT	L/L	0.378	0.097	0.290	0.464	4	3
MCV	fL	45.3	11.9	38.4	59.1	3	2
MCH	pg/cell	14.2	1.7	13.1	16.2	3	2
MCHC	g/L	321	41	274	348	3	2
PLATELET COUNT	*10 <sup>12</sup> /L	.3450	.0000	.3450	.3450	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	7.135	5.180	2.740	13.90	4	3
LYMPHOCYTES	*10 <sup>9</sup> /L	5.085	1.885	3.590	7.730	4	3
MONOCYTES	*10 <sup>9</sup> /L	0.369	0.228	0.072	0.625	4	3
EOSINOPHILS	*10 <sup>9</sup> /L	0.830	0.726	0.156	1.840	4	3
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.205	0.000	0.205	0.205	1	1
CALCIUM	mMol/L	2.65	0.28	2.33	2.88	3	2
PHOSPHORUS	mMol/L	2.33	0.29	2.07	2.62	3	2
SODIUM	mMol/L	135	3	132	137	3	2
POTASSIUM	mMol/L	3.6	0.6	3.1	4.2	3	2
CHLORIDE	mMol/L	96	2	94	98	3	2
CARBON DIOXIDE	mMol/L	26.7	3.5	23.0	30.0	3	2
MAGNESIUM	mMol/L	0.741	0.173	0.617	0.864	2	1
BLOOD UREA NITROGEN	mMol/L	1.428	.7140	1.071	2.142	3	2
CREATININE	µMol/L	88	9	80	97	3	2
URIC ACID	mMol/L	0.012	0.000	0.012	0.012	2	1
TOTAL BILIRUBIN	µMol/L	10	5	7	15	3	2
DIRECT BILIRUBIN	µMol/L	2	0	2	2	1	1
INDIRECT BILIRUBIN	µMol/L	14	0	14	14	1	1
GLUCOSE	mMol/L	6.105	1.277	5.273	7.548	3	2
CHOLESTEROL	mMol/L	2.745	.7511	2.150	3.574	3	2
TRIGLYCERIDE	mMol/L	.3955	.0339	.3729	.4181	2	1
CREATINE PHOSPHOKINASE	U/L	130	110	55	256	3	2
LACTATE DEHYDROGENASE	U/L	393	123	306	480	2	1
ALKALINE PHOSPHATASE	U/L	61	25	46	90	3	2
ALANINE AMINOTRANSFERASE	U/L	15	6	8	20	3	2
ASPARTATE AMINOTRANSFERASE	U/L	68	10	59	79	3	2
GAMMA GLUTAMYLTRANSFERASE	U/L	16	6	9	20	3	2
AMYLASE	U/L	701.2	.0000	701.2	701.2	1	1
TOTAL PROTEIN (COLORIMETRY)	g/L	70	11	58	79	3	2
GLOBULIN (COLORIMETRY)	g/L	40	18	19	53	3	2
ALBUMIN (COLORIMETRY)	g/L	30	8	26	39	3	2

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for females only, ages: 8 days – 2 years**

Sample results submitted by 4 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	9.844	2.070	7.200	12.40	9	6
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	9.72	1.42	7.90	11.60	8	5
HEMOGLOBIN	g/L	143	9	134	162	7	5
HEMATOCRIT	L/L	0.411	0.034	0.355	0.478	8	6
MCV	fL	43.9	6.9	30.9	52.4	7	5
MCH	pg/cell	15.3	1.9	12.0	18.1	7	5
MCHC	g/L	351	18	335	389	7	5
PLATELET COUNT	*10 <sup>12</sup> /L	.2670	.0000	.2670	.2670	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	4.675	1.254	3.200	6.110	8	6
LYMPHOCYTES	*10 <sup>9</sup> /L	4.346	1.247	3.060	6.200	8	6
MONOCYTES	*10 <sup>9</sup> /L	0.221	0.131	0.072	0.390	7	6
EOSINOPHILS	*10 <sup>9</sup> /L	0.453	0.322	0.242	1.080	6	5
BASOPHILS	*10 <sup>9</sup> /L	0.084	0.009	0.077	0.090	2	1
CALCIUM	mMol/L	2.63	0.23	2.35	2.98	7	6
PHOSPHORUS	mMol/L	2.42	0.48	2.00	3.29	6	5
SODIUM	mMol/L	135	2	132	137	6	5
POTASSIUM	mMol/L	3.6	0.4	3.3	4.3	6	5
CHLORIDE	mMol/L	98	4	92	103	6	5
BICARBONATE	mMol/L	22.0	0.0	22.0	22.0	1	1
CARBON DIOXIDE	mMol/L	23.0	0.0	23.0	23.0	1	1
IRON	µMol/L	25.06	10.56	16.47	38.84	4	3
BLOOD UREA NITROGEN	mMol/L	3.213	1.071	1.785	4.641	7	6
CREATININE	µMol/L	106	27	44	133	7	6
URIC ACID	mMol/L	0.012	0.006	0.006	0.012	4	3
TOTAL BILIRUBIN	µMol/L	12	5	3	17	7	6
DIRECT BILIRUBIN	µMol/L	5	3	0	9	7	6
INDIRECT BILIRUBIN	µMol/L	7	2	3	9	7	6
GLUCOSE	mMol/L	6.605	1.887	4.274	9.380	7	6
CHOLESTEROL	mMol/L	5.387	1.191	3.626	6.786	6	5
TRIGLYCERIDE	mMol/L	.4407	.1808	.1808	.5763	4	3
CREATINE PHOSPHOKINASE	U/L	134	71	59	201	3	3
LACTATE DEHYDROGENASE	U/L	485	28	462	532	5	4
ALKALINE PHOSPHATASE	U/L	53	33	2	101	7	6
ALANINE AMINOTRANSFERASE	U/L	8	4	5	14	6	5
ASPARTATE AMINOTRANSFERASE	U/L	71	16	55	101	7	6
GAMMA GLUTAMYLTRANSFERASE	U/L	8	5	4	13	3	3
AMYLASE	U/L	574.8	.0000	574.8	574.8	1	1
TOTAL PROTEIN (COLORIMETRY)	g/L	64	6	55	71	6	5
GLOBULIN (COLORIMETRY)	g/L	31	7	24	41	6	5
ALBUMIN (COLORIMETRY)	g/L	33	5	30	42	6	5
FIBRINOGEN	g/L	3.000	.0000	3.000	3.000	1	1
Body Temperature:	°C	36.5	0.6	36.0	37.0	4	3

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated both sexes combined, ages: 8 days – 2 years**

Sample results submitted by 6 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	10.96	4.242	7.200	20.50	13	9
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	9.17	1.51	7.54	11.60	11	7
HEMOGLOBIN	g/L	133	19	101	162	10	7
HEMATOCRIT	L/L	0.400	0.060	0.290	0.478	12	9
MCV	fL	44.3	8.0	30.9	59.1	10	7
MCH	pg/cell	15.0	1.8	12.0	18.1	10	7
MCHC	g/L	342	28	274	389	10	7
PLATELET COUNT	*10 <sup>12</sup> /L	.3060	.0550	.2670	.3450	2	2
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	5.495	3.128	2.740	13.90	12	9
LYMPHOCYTES	*10 <sup>9</sup> /L	4.593	1.446	3.060	7.730	12	9
MONOCYTES	*10 <sup>9</sup> /L	0.275	0.177	0.072	0.625	11	9
EOSINOPHILS	*10 <sup>9</sup> /L	0.604	0.521	0.156	1.840	10	8
BASOPHILS	*10 <sup>9</sup> /L	0.084	0.009	0.077	0.090	2	1
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.205	0.000	0.205	0.205	1	1
CALCIUM	mMol/L	2.63	0.23	2.33	2.98	10	8
PHOSPHORUS	mMol/L	2.39	0.39	2.00	3.29	9	7
SODIUM	mMol/L	135	2	132	137	9	7
POTASSIUM	mMol/L	3.6	0.4	3.1	4.3	9	7
CHLORIDE	mMol/L	97	4	92	103	9	7
BICARBONATE	mMol/L	22.0	0.0	22.0	22.0	1	1
CARBON DIOXIDE	mMol/L	25.8	3.4	23.0	30.0	4	3
IRON	µMol/L	25.06	10.56	16.47	38.84	4	3
MAGNESIUM	mMol/L	0.741	0.173	0.617	0.864	2	1
BLOOD UREA NITROGEN	mMol/L	2.856	1.071	1.071	4.641	10	8
CREATININE	µMol/L	97	27	44	133	10	8
URIC ACID	mMol/L	0.012	0.000	0.006	0.012	6	4
TOTAL BILIRUBIN	µMol/L	12	5	3	17	10	8
DIRECT BILIRUBIN	µMol/L	5	3	0	9	8	7
INDIRECT BILIRUBIN	µMol/L	9	3	3	14	8	7
GLUCOSE	mMol/L	6.438	1.665	4.274	9.380	10	8
CHOLESTEROL	mMol/L	4.507	1.684	2.150	6.786	9	7
TRIGLYCERIDE	mMol/L	.4294	.1469	.1808	.5763	6	4
CREATINE PHOSPHOKINASE	U/L	132	83	55	256	6	5
LACTATE DEHYDROGENASE	U/L	459	71	306	532	7	5
ALKALINE PHOSPHATASE	U/L	55	29	2	101	10	8
ALANINE AMINOTRANSFERASE	U/L	10	5	5	20	9	7
ASPARTATE AMINOTRANSFERASE	U/L	70	14	55	101	10	8
GAMMA GLUTAMYLTRANSFERASE	U/L	12	7	4	20	6	5
AMYLASE	U/L	638.1	89.36	574.8	701.2	2	2
TOTAL PROTEIN (COLORIMETRY)	g/L	66	8	55	79	9	7
GLOBULIN (COLORIMETRY)	g/L	34	12	19	53	9	7
ALBUMIN (COLORIMETRY)	g/L	32	5	26	42	9	7
FIBRINOGEN	g/L	3.000	.0000	3.000	3.000	1	1
Body Temperature:	°C	36.5	0.6	36.0	37.0	4	3

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for males only, ages: 2 – 20 years**

Sample results submitted by 11 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	8.441	2.115	4.600	13.90	29	16
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	8.79	1.74	6.24	12.80	25	12
HEMOGLOBIN	g/L	149	19	113	179	25	12
HEMATOCRIT	L/L	0.431	0.039	0.344	0.531	29	16
MCV	fL	50.1	7.3	39.3	68.3	25	12
MCH	pg/cell	17.2	2.0	13.9	20.7	24	11
MCHC	g/L	344	24	265	379	25	12
PLATELET COUNT	*10 <sup>12</sup> /L	.2140	.0480	.1340	.2950	7	6
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	4.664	1.400	2.050	7.810	27	15
LYMPHOCYTES	*10 <sup>9</sup> /L	2.949	1.220	0.558	5.700	28	15
MONOCYTES	*10 <sup>9</sup> /L	0.236	0.141	0.084	0.556	21	13
EOSINOPHILS	*10 <sup>9</sup> /L	0.538	0.353	0.055	1.440	27	15
BASOPHILS	*10 <sup>9</sup> /L	0.080	0.035	0.055	0.104	2	1
CALCIUM	mMol/L	2.63	0.20	2.33	3.00	26	13
PHOSPHORUS	mMol/L	1.78	0.32	1.20	2.52	23	10
SODIUM	mMol/L	138	4	126	145	24	11
POTASSIUM	mMol/L	3.5	0.5	2.9	4.6	24	11
CHLORIDE	mMol/L	100	3	93	106	24	11
CARBON DIOXIDE	mMol/L	29.1	1.3	28.0	30.9	4	4
IRON	µMol/L	20.23	5.549	14.86	33.83	11	3
BLOOD UREA NITROGEN	mMol/L	3.213	.7140	2.142	4.641	27	14
CREATININE	µMol/L	115	27	71	177	22	12
URIC ACID	mMol/L	0.012	0.012	0.000	0.042	13	4
TOTAL BILIRUBIN	µMol/L	10	7	2	27	27	14
DIRECT BILIRUBIN	µMol/L	5	3	0	14	14	5
INDIRECT BILIRUBIN	µMol/L	9	7	2	26	14	5
GLUCOSE	mMol/L	5.495	1.277	3.386	9.047	27	14
CHOLESTEROL	mMol/L	6.708	2.383	3.160	10.15	24	11
TRIGLYCERIDE	mMol/L	.3842	.1582	.1808	.7119	22	10
CREATINE PHOSPHOKINASE	U/L	142	41	95	168	3	3
LACTATE DEHYDROGENASE	U/L	754	446	368	2278	17	7
ALKALINE PHOSPHATASE	U/L	26	9	13	52	26	13
ALANINE AMINOTRANSFERASE	U/L	9	6	4	28	23	11
ASPARTATE AMINOTRANSFERASE	U/L	90	65	28	325	26	14
GAMMA GLUTAMYLTRANSFERASE	U/L	26	26	3	75	8	6
AMYLASE	U/L	494.5	229.4	238.7	851.0	5	3
TOTAL PROTEIN (COLORIMETRY)	g/L	74	7	63	86	26	13
GLOBULIN (COLORIMETRY)	g/L	42	6	30	52	23	10
ALBUMIN (COLORIMETRY)	g/L	33	4	22	40	23	10
FIBRINOGEN	g/L	3.500	4.950	.0100	7.000	2	2
Body Temperature:	°C	36.5	0.5	36.0	37.0	13	8

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for females only, ages: 2 – 20 years**

Sample results submitted by 13 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	10.20	2.689	4.700	16.30	39	18
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	7.28	1.04	5.16	9.75	40	17
HEMOGLOBIN	g/L	133	16	103	175	39	16
HEMATOCRIT	L/L	0.391	0.054	0.273	0.528	41	19
MCV	fL	53.7	3.9	46.2	63.4	39	17
MCH	pg/cell	18.6	2.6	15.4	32.2	39	16
MCHC	g/L	346	48	283	608	38	16
PLATELET COUNT	*10 <sup>12</sup> /L	.2130	.0490	.1320	.3200	16	5
NUCLEATED RED BLOOD CELLS	/100 WBC	1	1	0	1	2	2
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	6.223	2.454	2.910	13.20	32	18
LYMPHOCYTES	*10 <sup>9</sup> /L	2.958	0.683	1.790	4.510	36	18
MONOCYTES	*10 <sup>9</sup> /L	0.295	0.282	0.069	1.350	32	15
EOSINOPHILS	*10 <sup>9</sup> /L	0.524	0.448	0.109	1.843	31	15
BASOPHILS	*10 <sup>9</sup> /L	0.058	0.043	0.002	0.104	5	3
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.798	0.374	0.576	1.230	3	2
CALCIUM	mMol/L	2.63	0.23	2.05	3.00	40	17
PHOSPHORUS	mMol/L	1.58	0.29	1.03	2.07	37	17
SODIUM	mMol/L	135	4	128	144	38	16
POTASSIUM	mMol/L	3.8	0.6	2.7	4.9	37	16
CHLORIDE	mMol/L	98	3	93	105	37	16
BICARBONATE	mMol/L	27.0	3.5	25.0	31.0	3	2
CARBON DIOXIDE	mMol/L	25.9	1.9	22.0	29.0	15	5
IRON	µMol/L	22.02	6.444	11.46	28.10	5	4
BLOOD UREA NITROGEN	mMol/L	2.856	.7140	1.428	4.641	41	18
CREATININE	µMol/L	115	27	80	177	36	15
URIC ACID	mMol/L	0.006	0.006	0.000	0.018	11	7
TOTAL BILIRUBIN	µMol/L	9	7	2	39	40	18
DIRECT BILIRUBIN	µMol/L	3	7	0	24	13	7
INDIRECT BILIRUBIN	µMol/L	7	5	2	19	13	7
GLUCOSE	mMol/L	5.162	1.388	2.886	9.102	41	18
CHOLESTEROL	mMol/L	4.921	1.140	2.512	8.806	36	16
TRIGLYCERIDE	mMol/L	.5198	.2373	.1921	1.198	27	11
CREATINE PHOSPHOKINASE	U/L	147	75	80	331	11	8
LACTATE DEHYDROGENASE	U/L	873	498	358	1765	26	11
ALKALINE PHOSPHATASE	U/L	33	19	8	75	38	16
ALANINE AMINOTRANSFERASE	U/L	10	7	2	27	24	14
ASPARTATE AMINOTRANSFERASE	U/L	68	18	39	112	39	16
GAMMA GLUTAMYLTRANSFERASE	U/L	9	4	3	17	13	11
AMYLASE	U/L	512.1	156.3	237.5	697.5	7	6
TOTAL PROTEIN (COLORIMETRY)	g/L	68	7	57	85	38	18
GLOBULIN (COLORIMETRY)	g/L	40	6	30	51	36	16
ALBUMIN (COLORIMETRY)	g/L	28	4	22	37	36	16
FIBRINOGEN	g/L	1.340	1.530	.0100	3.000	3	2
CORTISOL	nMol/L	19	0	19	19	1	1
PROGESTERONE	nMol/L	.0286	.0000	.0286	.0286	1	1
TRIIODOTHYRONINE UPTAKE	%	53	0	53	53	1	1
TOTAL THYROXINE	nMol/L	112	0	112	112	1	1
Body Temperature:	°C	36.1	0.7	35.0	37.0	14	10

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for both sexes combined, ages: 2 – 20 years**

Sample results submitted by 15 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	9.447	2.595	4.600	16.30	68	33
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	7.86	1.53	5.16	12.80	65	28
HEMOGLOBIN	g/L	139	19	103	179	64	27
HEMATOCRIT	L/L	0.407	0.052	0.273	0.531	70	34
MCV	fL	52.3	5.7	39.3	68.3	64	28
MCH	pg/cell	18.0	2.4	13.9	32.2	63	26
MCHC	g/L	345	40	265	608	63	27
PLATELET COUNT	*10 <sup>12</sup> /L	.2130	.0480	.1320	.3200	23	10
NUCLEATED RED BLOOD CELLS	/100 WBC	1	1	0	1	2	2
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	5.509	2.170	2.050	13.20	59	32
LYMPHOCYTES	*10 <sup>9</sup> /L	2.954	0.947	0.558	5.700	64	32
MONOCYTES	*10 <sup>9</sup> /L	0.272	0.236	0.069	1.350	53	27
EOSINOPHILS	*10 <sup>9</sup> /L	0.531	0.403	0.055	1.843	58	29
BASOPHILS	*10 <sup>9</sup> /L	0.064	0.039	0.002	0.104	7	4
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.798	0.374	0.576	1.230	3	2
CALCIUM	mMol/L	2.63	0.23	2.05	3.00	66	29
PHOSPHORUS	mMol/L	1.68	0.32	1.03	2.52	60	26
SODIUM	mMol/L	136	4	126	145	62	26
POTASSIUM	mMol/L	3.7	0.6	2.7	4.9	61	26
CHLORIDE	mMol/L	99	3	93	106	61	26
BICARBONATE	mMol/L	27.0	3.5	25.0	31.0	3	2
CARBON DIOXIDE	mMol/L	26.6	2.2	22.0	30.9	19	9
IRON	µMol/L	20.94	5.728	11.46	33.83	16	7
BLOOD UREA NITROGEN	mMol/L	2.856	.7140	1.428	4.641	68	31
CREATININE	µMol/L	115	27	71	177	58	26
URIC ACID	mMol/L	0.006	0.006	0.000	0.024	23	10
TOTAL BILIRUBIN	µMol/L	9	7	2	27	66	30
DIRECT BILIRUBIN	µMol/L	3	3	0	14	26	11
INDIRECT BILIRUBIN	µMol/L	7	5	2	26	26	11
GLUCOSE	mMol/L	5.328	1.332	2.886	9.102	68	31
CHOLESTEROL	mMol/L	5.646	1.943	2.512	10.15	60	26
TRIGLYCERIDE	mMol/L	.4633	.2147	.1808	1.198	49	20
CREATINE PHOSPHOKINASE	U/L	146	68	80	331	14	11
LACTATE DEHYDROGENASE	U/L	826	476	358	2278	43	17
ALKALINE PHOSPHATASE	U/L	30	16	8	75	64	28
ALANINE AMINOTRANSFERASE	U/L	10	6	2	28	47	24
ASPARTATE AMINOTRANSFERASE	U/L	73	32	28	257	64	28
GAMMA GLUTAMYLTRANSFERASE	U/L	15	18	3	75	21	17
AMYLASE	U/L	504.9	180.4	237.5	851.0	12	9
TOTAL PROTEIN (COLORIMETRY)	g/L	70	8	50	86	65	31
GLOBULIN (COLORIMETRY)	g/L	41	6	30	52	59	26
ALBUMIN (COLORIMETRY)	g/L	30	5	22	40	59	26
FIBRINOGEN	g/L	2.200	2.950	.0100	7.000	5	4
CORTISOL	nMol/L	19	0	19	19	1	1
PROGESTERONE	nMol/L	.0286	.0000	.0286	.0286	1	1
TRIIODOTHYRONINE UPTAKE	%	53	0	53	53	1	1
TOTAL THYROXINE	nMol/L	112	0	112	112	1	1
Body Temperature:	°C	36.3	0.6	35.0	37.0	27	18

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for males only, ages: > 20 years**

Sample results submitted by 4 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	10.07	3.617	5.700	14.00	5	4
bRED BLOOD CELL COUNT	*10 <sup>12</sup> /L	9.18	0.93	7.82	9.91	4	3
HEMOGLOBIN	g/L	146	11	138	154	2	2
HEMATOCRIT	L/L	0.446	0.043	0.387	0.505	5	4
MCV	fL	48.3	3.5	44.4	52.6	4	3
MCH	pg/cell	17.0	0.8	16.4	17.6	2	2
MCHC	g/L	354	5	350	357	2	2
PLATELET COUNT	*10 <sup>12</sup> /L	.2630	.0000	.2630	.2630	1	1
NUCLEATED RED BLOOD CELLS	/100 WBC	2	0	2	2	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	5.440	1.449	3.530	7.300	5	4
LYMPHOCYTES	*10 <sup>9</sup> /L	3.290	2.006	1.820	6.790	5	4
MONOCYTES	*10 <sup>9</sup> /L	0.352	0.133	0.225	0.536	4	3
EOSINOPHILS	*10 <sup>9</sup> /L	1.031	0.921	0.342	2.613	5	4
BASOPHILS	*10 <sup>9</sup> /L	0.117	0.033	0.093	0.140	2	2
CALCIUM	mMol/L	2.73	0.20	2.45	2.90	4	3
PHOSPHORUS	mMol/L	1.58	0.26	1.36	1.87	4	3
SODIUM	mMol/L	134	3	131	138	4	3
POTASSIUM	mMol/L	4.2	0.4	3.8	4.6	4	3
CHLORIDE	mMol/L	98	1	97	100	4	3
BICARBONATE	mMol/L	25.0	0.0	25.0	25.0	1	1
CARBON DIOXIDE	mMol/L	24.3	4.0	20.0	28.0	3	3
MAGNESIUM	mMol/L	1.070	0.000	1.070	1.070	1	1
BLOOD UREA NITROGEN	mMol/L	2.856	.3570	2.499	2.856	4	3
CREATININE	µMol/L	97	18	71	115	4	3
URIC ACID	mMol/L	0.018	0.000	0.018	0.018	1	1
TOTAL BILIRUBIN	µMol/L	5	2	3	9	4	3
DIRECT BILIRUBIN	µMol/L	2	0	2	2	1	1
INDIRECT BILIRUBIN	µMol/L	2	0	2	2	1	1
GLUCOSE	mMol/L	5.384	.9435	4.496	6.438	4	3
CHOLESTEROL	mMol/L	5.361	1.580	3.600	7.252	4	3
TRIGLYCERIDE	mMol/L	.5650	.2486	.3842	.7345	2	2
CREATINE PHOSPHOKINASE	U/L	130	27	102	161	4	3
LACTATE DEHYDROGENASE	U/L	503	25	485	521	2	2
ALKALINE PHOSPHATASE	U/L	39	14	22	56	4	3
ALANINE AMINOTRANSFERASE	U/L	9	4	4	14	4	3
ASPARTATE AMINOTRANSFERASE	U/L	79	12	65	92	4	3
GAMMA GLUTAMYLTRANSFERASE	U/L	13	8	6	22	3	3
TOTAL PROTEIN (COLORIMETRY)	g/L	70	7	62	77	4	3
GLOBULIN (COLORIMETRY)	g/L	42	6	36	48	4	3
ALBUMIN (COLORIMETRY)	g/L	29	3	25	32	4	3
Body Temperature:	°C	35.0	0.0	35.0	35.0	1	1

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.



**Physiological reference ranges calculated for females only, ages: > 20 years**

Sample results submitted by 2 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	8.500	6.930	3.600	13.40	2	2
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	7.05	0.03	7.03	7.07	2	2
HEMOGLOBIN	g/L	139	2	137	140	2	2
HEMATOCRIT	L/L	0.377	0.034	0.356	0.416	3	2
MCV	fL	54.7	5.8	50.6	58.8	2	2
MCH	pg/cell	19.7	0.2	19.5	19.8	2	2
MCHC	g/L	361	34	337	385	2	2
PLATELET COUNT	*10 <sup>12</sup> /L	.2140	.0000	.2140	.2140	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	3.830	2.164	2.300	5.360	2	2
LYMPHOCYTES	*10 <sup>9</sup> /L	2.670	2.093	1.190	4.150	2	2
MONOCYTES	*10 <sup>9</sup> /L	0.456	0.492	0.108	0.804	2	2
EOSINOPHILS	*10 <sup>9</sup> /L	3.082	0.000	3.082	3.082	1	1
CALCIUM	mMol/L	2.90	0.30	2.68	3.10	2	2
PHOSPHORUS	mMol/L	1.87	0.23	1.71	2.03	2	2
SODIUM	mMol/L	137	1	136	138	2	2
POTASSIUM	mMol/L	4.0	0.0	4.0	4.0	2	2
CHLORIDE	mMol/L	101	1	100	101	2	2
BICARBONATE	mMol/L	23.0	0.0	23.0	23.0	1	1
CARBON DIOXIDE	mMol/L	28.0	0.0	28.0	28.0	1	1
IRON	µMol/L	29.36	.0000	29.36	29.36	1	1
BLOOD UREA NITROGEN	mMol/L	4.641	.7140	3.927	4.998	2	2
CREATININE	µMol/L	133	0	133	133	2	2
URIC ACID	mMol/L	0.030	0.000	0.030	0.030	1	1
TOTAL BILIRUBIN	µMol/L	5	2	3	7	2	2
DIRECT BILIRUBIN	µMol/L	2	0	2	2	1	1
INDIRECT BILIRUBIN	µMol/L	2	0	2	2	1	1
GLUCOSE	mMol/L	5.217	.2220	5.051	5.328	2	2
CHOLESTEROL	mMol/L	4.403	.0518	4.351	4.429	2	2
TRIGLYCERIDE	mMol/L	.5537	.0678	.4972	.5989	2	2
CREATINE PHOSPHOKINASE	U/L	190	0	190	190	1	1
LACTATE DEHYDROGENASE	U/L	450	0	450	450	1	1
ALKALINE PHOSPHATASE	U/L	12	11	4	20	2	2
ALANINE AMINOTRANSFERASE	U/L	9	3	7	11	2	2
ASPARTATE AMINOTRANSFERASE	U/L	72	2	70	73	2	2
AMYLASE	U/L	671.2	.0000	671.2	671.2	1	1
TOTAL PROTEIN (COLORIMETRY)	g/L	71	3	69	73	2	2
GLOBULIN (COLORIMETRY)	g/L	39	4	36	42	2	2
ALBUMIN (COLORIMETRY)	g/L	32	1	31	33	2	2
Body Temperature:	°C	36.0	0.0	36.0	36.0	1	1

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for both sexes combined, ages: > 20 years**

Sample results submitted by 5 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	9.624	4.161	3.600	14.00	7	6
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	8.47	1.32	7.03	9.91	6	5
HEMOGLOBIN	g/L	142	8	137	154	4	4
HEMATOCRIT	L/L	0.421	0.051	0.356	0.505	8	6
MCV	fL	50.5	5.0	44.4	58.8	6	5
MCH	pg/cell	18.3	1.6	16.4	19.8	4	4
MCHC	g/L	357	20	337	385	4	4
PLATELET COUNT	*10 <sup>12</sup> /L	.2390	.0350	.2140	.2630	2	2
NUCLEATED RED BLOOD CELLS	/100 WBC	2	0	2	2	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	4.980	1.673	2.300	7.300	7	6
LYMPHOCYTES	*10 <sup>9</sup> /L	3.113	1.872	1.190	6.790	7	6
MONOCYTES	*10 <sup>9</sup> /L	0.387	0.249	0.108	0.804	6	5
EOSINOPHILS	*10 <sup>9</sup> /L	1.373	1.175	0.342	3.082	6	5
BASOPHILS	*10 <sup>9</sup> /L	0.117	0.033	0.093	0.140	2	2
CALCIUM	mMol/L	2.78	0.23	2.45	3.10	6	5
PHOSPHORUS	mMol/L	1.68	0.26	1.36	2.03	6	5
SODIUM	mMol/L	135	3	131	138	6	5
POTASSIUM	mMol/L	4.2	0.3	3.8	4.6	6	5
CHLORIDE	mMol/L	99	2	97	101	6	5
BICARBONATE	mMol/L	24.0	1.4	23.0	25.0	2	2
CARBON DIOXIDE	mMol/L	25.3	3.8	20.0	28.0	4	4
IRON	µMol/L	29.36	.0000	29.36	29.36	1	1
MAGNESIUM	mMol/L	1.070	0.000	1.070	1.070	1	1
BLOOD UREA NITROGEN	mMol/L	3.213	1.071	2.499	4.998	6	5
CREATININE	µMol/L	115	27	71	133	6	5
URIC ACID	mMol/L	0.024	0.006	0.018	0.030	2	2
TOTAL BILIRUBIN	µMol/L	5	2	3	9	6	5
DIRECT BILIRUBIN	µMol/L	2	0	2	2	2	2
INDIRECT BILIRUBIN	µMol/L	2	0	2	2	2	2
GLUCOSE	mMol/L	5.328	.7215	4.496	6.438	6	5
CHOLESTEROL	mMol/L	5.025	1.321	3.600	7.252	6	5
TRIGLYCERIDE	mMol/L	.5537	.1469	.3842	.7345	4	4
CREATINE PHOSPHOKINASE	U/L	142	35	102	190	5	4
LACTATE DEHYDROGENASE	U/L	485	36	450	521	3	3
ALKALINE PHOSPHATASE	U/L	30	19	4	56	6	5
ALANINE AMINOTRANSFERASE	U/L	9	4	4	14	6	5
ASPARTATE AMINOTRANSFERASE	U/L	76	10	65	92	6	5
GAMMA GLUTAMYLTRANSFERASE	U/L	13	8	6	22	3	3
AMYLASE	U/L	671.2	.0000	671.2	671.2	1	1
TOTAL PROTEIN (COLORIMETRY)	g/L	71	6	62	77	6	5
GLOBULIN (COLORIMETRY)	g/L	41	5	36	48	6	5
ALBUMIN (COLORIMETRY)	g/L	30	3	25	33	6	5
Body Temperature:	°C	35.5	0.7	35.0	36.0	2	2

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for males only, all ages combined**

Sample results submitted by 13 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	9.134	3.326	4.600	20.50	39	21
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	8.70	1.60	6.24	12.80	33	15
HEMOGLOBIN	g/L	144	22	101	179	31	15
HEMATOCRIT	L/L	0.425	0.052	0.290	0.531	39	21
MCV	fL	49.3	7.3	38.4	68.3	33	15
MCH	pg/cell	16.8	2.0	13.1	20.7	30	14
MCHC	g/L	344	26	265	381	31	15
PLATELET COUNT	*10 <sup>12</sup> /L	.2340	.0610	.1340	.3450	9	7
NUCLEATED RED BLOOD CELLS	/100 WBC	2	0	2	2	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	5.058	2.122	2.050	13.90	37	20
LYMPHOCYTES	*10 <sup>9</sup> /L	3.171	1.534	0.558	7.730	38	20
MONOCYTES	*10 <sup>9</sup> /L	0.271	0.155	0.072	0.625	30	17
EOSINOPHILS	*10 <sup>9</sup> /L	0.630	0.514	0.055	2.613	37	20
BASOPHILS	*10 <sup>9</sup> /L	0.098	0.035	0.055	0.140	4	3
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.205	0.000	0.205	0.205	1	1
CALCIUM	mMol/L	2.65	0.23	2.33	3.08	34	18
PHOSPHORUS	mMol/L	1.81	0.36	1.20	2.62	30	14
SODIUM	mMol/L	137	4	126	145	31	15
POTASSIUM	mMol/L	3.6	0.6	2.9	4.6	31	15
CHLORIDE	mMol/L	99	3	93	106	31	15
BICARBONATE	mMol/L	25.0	0.0	25.0	25.0	1	1
CARBON DIOXIDE	mMol/L	26.9	3.4	20.0	30.9	10	9
IRON	µMol/L	20.23	5.549	14.86	33.83	11	3
MAGNESIUM	mMol/L	0.852	0.226	0.617	1.070	3	2
BLOOD UREA NITROGEN	mMol/L	3.213	1.071	1.428	6.783	34	19
CREATININE	µMol/L	106	27	44	177	30	17
URIC ACID	mMol/L	0.012	0.012	0.000	0.042	16	5
TOTAL BILIRUBIN	µMol/L	10	7	2	27	35	19
DIRECT BILIRUBIN	µMol/L	5	3	0	14	16	7
INDIRECT BILIRUBIN	µMol/L	9	7	2	26	16	7
GLUCOSE	mMol/L	5.661	1.277	3.386	9.047	36	19
CHOLESTEROL	mMol/L	6.087	2.461	2.150	10.15	32	16
TRIGLYCERIDE	mMol/L	.4181	.1808	.1808	.8362	27	13
CREATINE PHOSPHOKINASE	U/L	134	57	55	256	10	8
LACTATE DEHYDROGENASE	U/L	696	419	306	2278	21	9
ALKALINE PHOSPHATASE	U/L	31	15	13	90	33	17
ALANINE AMINOTRANSFERASE	U/L	11	7	4	33	31	16
ASPARTATE AMINOTRANSFERASE	U/L	90	61	28	325	34	19
GAMMA GLUTAMYLTRANSFERASE	U/L	37	63	3	254	15	12
AMYLASE	U/L	528.9	221.8	238.7	851.0	6	4
TOTAL PROTEIN (COLORIMETRY)	g/L	73	7	61	86	33	17
GLOBULIN (COLORIMETRY)	g/L	42	6	30	53	29	14
ALBUMIN (COLORIMETRY)	g/L	32	4	22	40	29	14
FIBRINOGEN	g/L	3.500	4.950	.0100	7.000	2	2
Body Temperature:	°C	36.4	0.6	35.0	37.0	14	9

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for females only, all ages combined**

Sample results submitted by 18 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	10.05	2.793	3.600	16.30	55	28
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	7.62	1.37	5.16	11.60	55	27
HEMOGLOBIN	g/L	133	17	95	175	51	24
HEMATOCRIT	L/L	0.391	0.063	0.270	0.633	57	28
MCV	fL	52.2	8.7	30.9	94.1	53	26
MCH	pg/cell	17.9	2.8	12.0	32.2	51	24
MCHC	g/L	343	48	194	608	51	24
PLATELET COUNT	*10 <sup>12</sup> /L	.2160	.0460	.1320	.3200	19	7
NUCLEATED RED BLOOD CELLS	/100 WBC	1	1	0	1	2	2
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	5.970	2.485	2.300	13.20	47	28
LYMPHOCYTES	*10 <sup>9</sup> /L	3.077	1.076	0.612	6.200	51	28
MONOCYTES	*10 <sup>9</sup> /L	0.273	0.263	0.036	1.350	45	25
EOSINOPHILS	*10 <sup>9</sup> /L	0.537	0.579	0.106	3.082	42	23
BASOPHILS	*10 <sup>9</sup> /L	0.071	0.039	0.002	0.115	8	5
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.809	0.595	0.072	1.580	5	4
CALCIUM	mMol/L	2.65	0.23	2.05	3.10	53	25
PHOSPHORUS	mMol/L	1.71	0.42	1.03	3.29	49	25
SODIUM	mMol/L	135	4	128	144	49	23
POTASSIUM	mMol/L	3.9	0.6	2.7	5.1	49	24
CHLORIDE	mMol/L	98	3	90	106	49	24
BICARBONATE	mMol/L	25.2	3.5	22.0	31.0	5	4
CARBON DIOXIDE	mMol/L	25.7	2.1	22.0	29.0	19	9
IRON	µMol/L	23.99	7.876	11.46	38.84	10	6
BLOOD UREA NITROGEN	mMol/L	2.856	.7140	1.428	4.998	53	25
CREATININE	µMol/L	115	27	53	177	48	23
URIC ACID	mMol/L	0.012	0.006	0.000	0.030	16	9
TOTAL BILIRUBIN	µMol/L	10	7	2	27	52	26
DIRECT BILIRUBIN	µMol/L	3	3	0	12	22	13
INDIRECT BILIRUBIN	µMol/L	7	5	2	19	22	13
GLUCOSE	mMol/L	5.550	1.554	2.886	9.380	54	26
CHOLESTEROL	mMol/L	4.895	1.191	2.486	8.806	47	23
TRIGLYCERIDE	mMol/L	.5198	.2260	.1808	1.198	33	14
CREATINE PHOSPHOKINASE	U/L	162	93	59	418	17	13
LACTATE DEHYDROGENASE	U/L	799	474	358	1765	32	13
ALKALINE PHOSPHATASE	U/L	87	214	2	1176	50	23
ALANINE AMINOTRANSFERASE	U/L	9	6	2	27	35	22
ASPARTATE AMINOTRANSFERASE	U/L	72	21	39	145	52	25
GAMMA GLUTAMYLTRANSFERASE	U/L	9	4	3	17	16	13
AMYLASE	U/L	493.2	194.6	101.2	697.5	10	9
TOTAL PROTEIN (COLORIMETRY)	g/L	67	7	55	85	51	26
GLOBULIN (COLORIMETRY)	g/L	39	7	23	54	48	23
ALBUMIN (COLORIMETRY)	g/L	29	5	18	42	48	23
FIBRINOGEN	g/L	2.000	1.260	.0100	3.000	6	4
CORTISOL	nMol/L	19	0	19	19	1	1
PROGESTERONE	nMol/L	.0286	.0000	.0286	.0286	1	1
TRIIODOTHYRONINE UPTAKE	%	53	0	53	53	1	1
TOTAL THYROXINE	nMol/L	112	0	112	112	1	1
Body Temperature:	°C	36.2	0.6	35.0	37.0	19	13

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for both sexes combined, all ages combined**

Sample results submitted by 19 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	9.669	3.042	3.600	20.50	94	48
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	8.02	1.54	5.16	12.80	88	41
HEMOGLOBIN	g/L	137	19	95	179	82	38
HEMATOCRIT	L/L	0.405	0.061	0.270	0.633	96	48
MCV	fL	51.1	8.3	30.9	94.1	86	40
MCH	pg/cell	17.5	2.6	12.0	32.2	81	37
MCHC	g/L	343	41	194	608	82	38
PLATELET COUNT	*10 <sup>12</sup> /L	.2220	.0510	.1320	.3450	28	13
NUCLEATED RED BLOOD CELLS	/100 WBC	1	1	0	2	3	3
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	5.568	2.363	2.050	13.90	84	47
LYMPHOCYTES	*10 <sup>9</sup> /L	3.117	1.284	0.558	7.730	89	47
MONOCYTES	*10 <sup>9</sup> /L	0.272	0.224	0.036	1.350	75	41
EOSINOPHILS	*10 <sup>9</sup> /L	0.580	0.548	0.055	3.082	79	42
BASOPHILS	*10 <sup>9</sup> /L	0.080	0.038	0.002	0.140	12	7
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.709	0.587	0.072	1.580	6	5
CALCIUM	mMol/L	2.65	0.23	2.05	3.10	87	42
PHOSPHORUS	mMol/L	1.74	0.39	1.03	3.29	79	38
SODIUM	mMol/L	136	4	126	148	81	38
POTASSIUM	mMol/L	3.8	0.6	2.7	5.1	80	38
CHLORIDE	mMol/L	99	3	90	106	80	38
BICARBONATE	mMol/L	25.2	3.1	22.0	31.0	6	5
CARBON DIOXIDE	mMol/L	26.2	2.6	20.0	30.9	29	17
IRON	µMol/L	22.02	6.802	11.46	38.84	21	9
MAGNESIUM	mMol/L	0.852	0.226	0.617	1.070	3	2
BLOOD UREA NITROGEN	mMol/L	2.856	1.071	1.071	6.783	88	43
CREATININE	µMol/L	115	27	53	177	77	38
URIC ACID	mMol/L	0.012	0.012	0.000	0.042	32	14
TOTAL BILIRUBIN	µMol/L	10	7	2	27	87	44
DIRECT BILIRUBIN	µMol/L	3	3	0	14	38	20
INDIRECT BILIRUBIN	µMol/L	7	5	2	26	38	20
GLUCOSE	mMol/L	5.606	1.443	2.886	9.380	90	44
CHOLESTEROL	mMol/L	5.387	1.891	2.150	10.15	79	38
TRIGLYCERIDE	mMol/L	.4746	.2034	.1808	1.198	60	26
CREATINE PHOSPHOKINASE	U/L	151	82	55	418	27	20
LACTATE DEHYDROGENASE	U/L	758	452	306	2278	53	21
ALKALINE PHOSPHATASE	U/L	33	20	2	101	80	37
ALANINE AMINOTRANSFERASE	U/L	10	6	2	33	66	37
ASPARTATE AMINOTRANSFERASE	U/L	76	33	28	257	85	42
GAMMA GLUTAMYLTRANSFERASE	U/L	26	50	3	254	32	24
AMYLASE	U/L	506.5	198.7	101.2	851.0	16	13
TOTAL PROTEIN (COLORIMETRY)	g/L	69	8	50	86	85	43
GLOBULIN (COLORIMETRY)	g/L	40	7	23	54	77	36
ALBUMIN (COLORIMETRY)	g/L	30	5	18	42	77	36
FIBRINOGEN	g/L	2.380	2.260	.0100	7.000	8	6
CORTISOL	nMol/L	19	0	19	19	1	1
PROGESTERONE	nMol/L	.0286	.0000	.0286	.0286	1	1
TRIIODOTHYRONINE UPTAKE	%	53	0	53	53	1	1
TOTAL THYROXINE	nMol/L	112	0	112	112	1	1
Body Temperature:	°C	36.3	0.6	35.0	37.0	33	22

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Average weights calculated for both sexes combined**

Weights submitted by ISIS member institutions.

Age Grouping	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
0-1 days	Kg	8.413	2.157	5.100	11.30	10	9
0.9-1.1 months	Kg	20.06	4.04	14.55	25.59	10	5

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for males only, age: < 8 days**

Sample results submitted by 3 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	8.683	1.463	7.450	10.30	3	3
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	4.22	0.00	4.22	4.22	1	1
HEMOGLOBIN	g/L	105	24	88	122	2	2
HEMATOCRIT	L/L	0.372	0.167	0.240	0.560	3	3
MCV	fL	56.9	0.0	56.9	56.9	1	1
MCH	pg/cell	20.9	0.0	20.9	20.9	1	1
MCHC	g/L	377	14	367	387	2	2
LYMPHOCYTES	*10 <sup>9</sup> /L	0.671	0.000	0.671	0.671	1	1
MONOCYTES	*10 <sup>9</sup> /L	0.224	0.000	0.224	0.224	1	1
EOSINOPHILS	*10 <sup>9</sup> /L	0.075	0.000	0.075	0.075	1	1
GLUCOSE	mMol/L	7.770	.0000	7.770	7.770	1	1

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for females only, age: < 8 days**

Sample results submitted by 1 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	5.640	0.000	5.640	5.640	1	1
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	5.91	0.00	5.91	5.91	1	1
HEMOGLOBIN	g/L	103	0	103	103	1	1
HEMATOCRIT	L/L	0.310	0.000	0.310	0.310	1	1
MCV	fL	52.5	0.0	52.5	52.5	1	1
MCH	pg/cell	17.4	0.0	17.4	17.4	1	1
MCHC	g/L	332	0	332	332	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	4.620	0.000	4.620	4.620	1	1
LYMPHOCYTES	*10 <sup>9</sup> /L	0.959	0.000	0.959	0.959	1	1
EOSINOPHILS	*10 <sup>9</sup> /L	0.056	0.000	0.056	0.056	1	1
TOTAL PROTEIN (COLORIMETRY)	g/L	88	0	88	88	1	1

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for both sexes combined, age: < 8 days**

Sample results submitted by 4 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Simple Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	7.923	1.935	5.640	10.30	4	4
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	5.07	1.20	4.22	5.91	2	2
HEMOGLOBIN	g/L	104	17	88	122	3	3
HEMATOCRIT	L/L	0.356	0.140	0.240	0.560	4	4
MCV	fL	54.7	3.1	52.5	56.9	2	2
MCH	pg/cell	19.2	2.5	17.4	20.9	2	2
MCHC	g/L	362	28	332	387	3	3
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	4.620	0.000	4.620	4.620	1	1
LYMPHOCYTES	*10 <sup>9</sup> /L	0.815	0.204	0.671	0.959	2	2
MONOCYTES	*10 <sup>9</sup> /L	0.224	0.000	0.224	0.224	1	1
EOSINOPHILS	*10 <sup>9</sup> /L	0.066	0.013	0.056	0.075	2	2
GLUCOSE	mMol/L	7.770	.0000	7.770	7.770	1	1
TOTAL PROTEIN (COLORIMETRY)	g/L	88	0	88	88	1	1

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for males only, ages: 8 days – 3 years**

Sample results submitted by 10 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	9.113	2.475	5.500	14.70	19	14
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	5.41	0.61	4.62	6.60	13	9
HEMOGLOBIN	g/L	125	16	90	151	16	12
HEMATOCRIT	L/L	0.365	0.046	0.260	0.460	21	16
MCV	fL	68.8	4.3	60.7	78.8	13	9
MCH	pg/cell	24.2	1.5	21.5	26.6	13	9
MCHC	g/L	344	34	237	389	16	12
PLATELET COUNT	*10 <sup>12</sup> /L	.4310	.1570	.3120	.6560	4	4
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	5.523	1.814	3.520	10.60	19	14
LYMPHOCYTES	*10 <sup>9</sup> /L	3.137	1.256	1.390	6.320	19	14
MONOCYTES	*10 <sup>9</sup> /L	0.314	0.241	0.058	0.851	17	13
EOSINOPHILS	*10 <sup>9</sup> /L	0.131	0.086	0.066	0.312	10	7
BASOPHILS	*10 <sup>9</sup> /L	0.095	0.019	0.081	0.116	3	3
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.600	0.754	0.055	1.460	3	3
CALCIUM	mMol/L	2.70	0.28	2.10	3.20	21	16
PHOSPHORUS	mMol/L	2.16	0.36	1.68	2.84	18	14
SODIUM	mMol/L	136	3	129	140	20	15
POTASSIUM	mMol/L	3.9	0.8	3.0	5.8	20	15
CHLORIDE	mMol/L	97	3	92	103	19	14
BICARBONATE	mMol/L	27.0	0.0	27.0	27.0	1	1
CARBON DIOXIDE	mMol/L	23.9	4.3	19.0	30.0	5	5
IRON	µMol/L	32.04	7.339	24.88	41.17	6	4
MAGNESIUM	mMol/L	0.403	0.091	0.288	0.535	5	4
BLOOD UREA NITROGEN	mMol/L	3.570	.7140	1.785	4.641	20	15
CREATININE	µMol/L	133	27	97	194	21	16
URIC ACID	mMol/L	0.012	0.006	0.000	0.018	10	7
TOTAL BILIRUBIN	µMol/L	12	9	2	38	21	16
DIRECT BILIRUBIN	µMol/L	3	2	2	3	6	4
INDIRECT BILIRUBIN	µMol/L	5	2	3	5	6	4
GLUCOSE	mMol/L	6.050	1.832	3.275	11.21	21	16
CHOLESTEROL	mMol/L	3.859	.6475	2.357	4.817	19	14
TRIGLYCERIDE	mMol/L	.3729	.2260	.1017	.9718	14	11
CREATINE PHOSPHOKINASE	U/L	305	213	131	723	10	9
LACTATE DEHYDROGENASE	U/L	1034	2029	185	7690	13	8
ALKALINE PHOSPHATASE	U/L	32	20	2	73	19	14
ALANINE AMINOTRANSFERASE	U/L	11	6	3	27	18	13
ASPARTATE AMINOTRANSFERASE	U/L	113	41	75	246	21	16
GAMMA GLUTAMYLTRANSFERASE	U/L	21	8	11	38	11	10
AMYLASE	U/L	393.9	171.7	111.0	525.4	5	5
LIPASE	U/L	14.46	18.63	.5560	35.58	3	3
TOTAL PROTEIN (COLORIMETRY)	g/L	65	7	55	81	18	15
GLOBULIN (COLORIMETRY)	g/L	36	7	25	49	16	13
ALBUMIN (COLORIMETRY)	g/L	30	5	20	37	16	13
GAMMA GLOBULIN (ELECTROPHORESIS)	g/L	8	0	8	8	1	1
ALBUMIN (ELECTROPHORESIS)	g/L	34	0	34	34	1	1
ALPHA-1 GLOBULIN (ELECTROPHORESIS)	g/L	0.002	0.000	0.002	0.002	1	1
BETA GLOBULIN (ELECTROPHORESIS)	g/L	0.009	0.000	0.009	0.009	1	1
Body Temperature:	°C	37.2	0.8	36.0	38.0	11	7

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for females only, ages: 8 days – 3 years**

Sample results submitted by 11 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	10.88	4.344	5.800	23.90	20	17
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	6.00	1.37	3.68	8.52	13	9
HEMOGLOBIN	g/L	123	24	81	162	15	12
HEMATOCRIT	L/L	0.367	0.062	0.278	0.480	21	17
MCV	fL	62.0	15.2	39.0	103.3	13	9
MCH	pg/cell	21.5	6.0	9.9	36.1	12	9
MCHC	g/L	340	32	254	394	15	12
PLATELET COUNT	*10 <sup>12</sup> /L	.3760	.0000	.3760	.3760	1	1
NUCLEATED RED BLOOD CELLS	/100 WBC	0	1	0	1	3	3
RETICULOCYTES	%	0.0	0.0	0.0	0.0	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	5.111	2.522	2.540	12.70	18	15
LYMPHOCYTES	*10 <sup>9</sup> /L	4.572	2.238	2.090	10.80	17	14
MONOCYTES	*10 <sup>9</sup> /L	0.417	0.225	0.129	0.875	16	14
EOSINOPHILS	*10 <sup>9</sup> /L	0.127	0.125	0.000	0.366	7	7
BASOPHILS	*10 <sup>9</sup> /L	0.040	0.069	0.000	0.120	3	3
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.372	0.662	0.000	1.700	6	6
CALCIUM	mMol/L	2.65	0.15	2.43	2.93	15	13
PHOSPHORUS	mMol/L	2.26	0.36	1.58	2.91	15	13
SODIUM	mMol/L	135	3	131	143	15	13
POTASSIUM	mMol/L	3.6	0.5	3.1	5.2	15	13
CHLORIDE	mMol/L	97	4	92	107	15	13
BICARBONATE	mMol/L	27.0	4.2	24.0	29.9	2	2
CARBON DIOXIDE	mMol/L	25.7	1.0	24.8	27.0	4	4
IRON	µMol/L	25.78	9.666	12.89	35.80	5	4
MAGNESIUM	mMol/L	0.535	0.123	0.411	0.658	3	3
BLOOD UREA NITROGEN	mMol/L	3.213	.7140	2.142	4.641	16	14
CREATININE	µMol/L	124	9	106	150	15	13
URIC ACID	mMol/L	0.018	0.018	0.000	0.071	10	9
TOTAL BILIRUBIN	µMol/L	12	7	3	26	15	13
DIRECT BILIRUBIN	µMol/L	2	3	0	7	8	6
INDIRECT BILIRUBIN	µMol/L	9	9	2	26	8	6
GLUCOSE	mMol/L	6.105	1.166	3.608	8.270	15	13
CHOLESTEROL	mMol/L	3.445	.8547	2.046	5.128	15	13
TRIGLYCERIDE	mMol/L	.2938	.1356	.1356	.6102	11	10
CREATINE PHOSPHOKINASE	U/L	235	62	170	337	6	6
LACTATE DEHYDROGENASE	U/L	780	532	291	1515	12	10
ALKALINE PHOSPHATASE	U/L	35	14	12	61	15	13
ALANINE AMINOTRANSFERASE	U/L	12	7	3	27	14	12
ASPARTATE AMINOTRANSFERASE	U/L	113	43	56	209	15	13
GAMMA GLUTAMYLTRANSFERASE	U/L	30	36	6	97	7	7
AMYLASE	U/L	753.5	555.7	235.3	1674	6	6
LIPASE	U/L	20.02	31.97	1.390	56.99	3	3
TOTAL PROTEIN (COLORIMETRY)	g/L	63	6	52	72	14	12
GLOBULIN (COLORIMETRY)	g/L	33	6	23	40	15	13
ALBUMIN (COLORIMETRY)	g/L	30	5	21	37	15	13
GAMMA GLOBULIN (ELECTROPHORESIS)	g/L	4	0	4	4	1	1
ALBUMIN (ELECTROPHORESIS)	g/L	36	0	36	36	1	1
ALPHA-1 GLOBULIN (ELECTROPHORESIS)	g/L	0.002	0.000	0.002	0.002	1	1
BETA GLOBULIN (ELECTROPHORESIS)	g/L	0.012	0.000	0.012	0.012	1	1
PROGESTERONE	nMol/L	.1002	.0000	.1002	.1002	1	1
Body Temperature:	°C	36.9	0.7	36.0	38.0	8	6

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.



**Physiological reference ranges calculated both sexes combined, ages: 8 days – 3 years**

Sample results submitted by 14 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	10.02	3.625	5.500	23.90	39	30
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	5.70	1.08	3.68	8.52	26	17
HEMOGLOBIN	g/L	124	20	81	162	31	23
HEMATOCRIT	L/L	0.366	0.054	0.260	0.480	42	32
MCV	fL	65.4	11.5	39.0	103.3	26	17
MCH	pg/cell	22.9	4.4	9.9	36.1	25	17
MCHC	g/L	342	33	237	394	31	23
PLATELET COUNT	*10 <sup>12</sup> /L	.4200	.1380	.3120	.6560	5	5
NUCLEATED RED BLOOD CELLS	/100 WBC	0	1	0	1	3	3
RETICULOCYTES	%	0.0	0.0	0.0	0.0	1	1
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	5.322	2.166	2.540	12.70	37	28
LYMPHOCYTES	*10 <sup>9</sup> /L	3.815	1.905	1.390	10.80	36	27
MONOCYTES	*10 <sup>9</sup> /L	0.364	0.236	0.058	0.875	33	27
EOSINOPHILS	*10 <sup>9</sup> /L	0.130	0.100	0.000	0.366	17	13
BASOPHILS	*10 <sup>9</sup> /L	0.068	0.054	0.000	0.120	6	6
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.448	0.655	0.000	1.700	9	9
CALCIUM	mMol/L	2.68	0.23	2.10	3.20	36	28
PHOSPHORUS	mMol/L	2.23	0.36	1.58	2.91	33	26
SODIUM	mMol/L	135	3	129	143	35	27
POTASSIUM	mMol/L	3.8	0.7	3.0	5.8	35	27
CHLORIDE	mMol/L	97	3	92	107	34	26
BICARBONATE	mMol/L	27.0	3.0	24.0	29.9	3	3
CARBON DIOXIDE	mMol/L	24.7	3.3	19.0	30.0	9	8
IRON	µMol/L	29.18	8.771	12.89	41.17	11	8
MAGNESIUM	mMol/L	0.453	0.115	0.288	0.658	8	7
BLOOD UREA NITROGEN	mMol/L	3.213	.7140	1.785	4.641	36	28
CREATININE	µMol/L	133	18	97	194	36	28
URIC ACID	mMol/L	0.012	0.006	0.000	0.024	19	14
TOTAL BILIRUBIN	µMol/L	12	9	2	38	36	28
DIRECT BILIRUBIN	µMol/L	3	2	0	7	14	10
INDIRECT BILIRUBIN	µMol/L	7	7	2	26	14	10
GLUCOSE	mMol/L	6.050	1.554	3.275	11.21	36	28
CHOLESTEROL	mMol/L	3.678	.7511	2.046	5.128	34	26
TRIGLYCERIDE	mMol/L	.3390	.1921	.1017	.9718	25	20
CREATINE PHOSPHOKINASE	U/L	279	173	131	723	16	14
LACTATE DEHYDROGENASE	U/L	630	468	185	1515	24	16
ALKALINE PHOSPHATASE	U/L	34	17	5	73	33	25
ALANINE AMINOTRANSFERASE	U/L	11	6	3	27	32	24
ASPARTATE AMINOTRANSFERASE	U/L	113	41	56	246	36	28
GAMMA GLUTAMYLTRANSFERASE	U/L	24	23	6	97	18	16
AMYLASE	U/L	590.2	448.8	111.0	1674	11	11
LIPASE	U/L	17.24	23.63	.5560	56.99	6	6
TOTAL PROTEIN (COLORIMETRY)	g/L	64	6	52	81	32	26
GLOBULIN (COLORIMETRY)	g/L	35	7	23	49	31	25
ALBUMIN (COLORIMETRY)	g/L	30	5	20	37	31	25
GAMMA GLOBULIN (ELECTROPHORESIS)	g/L	6	3	4	8	2	2
ALBUMIN (ELECTROPHORESIS)	g/L	35	1	34	36	2	2
ALPHA-1 GLOBULIN (ELECTROPHORESIS)	g/L	0.002	0.000	0.002	0.002	2	2
BETA GLOBULIN (ELECTROPHORESIS)	g/L	0.010	0.002	0.009	0.012	2	2
PROGESTERONE	nMol/L	.1002	.0000	.1002	.1002	1	1
Body Temperature:	°C	37.1	0.7	36.0	38.0	19	13

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for males only, ages: > 3 years**

Sample results submitted by 15 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	8.302	2.084	5.300	13.60	33	18
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	5.22	1.17	3.12	8.48	24	11
HEMOGLOBIN	g/L	135	23	92	205	29	15
HEMATOCRIT	L/L	0.398	0.057	0.285	0.569	33	18
MCV	fL	78.3	7.9	67.1	97.7	24	11
MCH	pg/cell	26.9	2.6	23.7	34.3	24	11
MCHC	g/L	341	23	275	376	29	15
PLATELET COUNT	*10 <sup>12</sup> /L	.2620	.1570	.1470	.5710	6	5
NUCLEATED RED BLOOD CELLS	/100 WBC	0	0	0	0	7	5
RETICULOCYTES	%	0.0	0.0	0.0	0.1	7	4
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	5.980	1.885	2.880	11.70	32	17
LYMPHOCYTES	*10 <sup>9</sup> /L	1.938	0.881	0.510	4.390	32	17
MONOCYTES	*10 <sup>9</sup> /L	0.267	0.205	0.000	0.872	29	16
EOSINOPHILS	*10 <sup>9</sup> /L	0.117	0.083	0.000	0.268	24	13
BASOPHILS	*10 <sup>9</sup> /L	0.038	0.073	0.000	0.240	14	7
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.234	0.276	0.000	0.990	18	9
ERYTHROCYTE SEDIMENTATION RATE		127	7	122	132	2	1
CALCIUM	mMol/L	2.65	0.20	2.23	3.28	35	17
PHOSPHORUS	mMol/L	1.78	0.23	1.20	2.20	35	17
SODIUM	mMol/L	134	4	127	144	29	15
POTASSIUM	mMol/L	4.1	0.5	3.1	4.8	31	15
CHLORIDE	mMol/L	95	3	90	101	31	15
BICARBONATE	mMol/L	23.3	7.2	13.0	29.3	4	3
CARBON DIOXIDE	mMol/L	25.0	5.5	15.0	30.0	6	5
IRON	µMol/L	27.57	12.53	15.22	51.73	7	6
MAGNESIUM	mMol/L	6.426	13.20	0.453	30.03	5	4
BLOOD UREA NITROGEN	mMol/L	3.927	1.071	1.785	6.783	36	18
CREATININE	µMol/L	133	27	53	203	30	15
URIC ACID	mMol/L	0.018	0.018	0.000	0.071	17	9
TOTAL BILIRUBIN	µMol/L	10	9	2	36	35	17
DIRECT BILIRUBIN	µMol/L	0	2	0	5	9	6
INDIRECT BILIRUBIN	µMol/L	9	7	3	22	9	6
GLUCOSE	mMol/L	5.328	1.221	2.831	8.381	36	18
CHOLESTEROL	mMol/L	3.497	.9324	.0000	4.895	35	17
TRIGLYCERIDE	mMol/L	.3051	.2147	.0791	.8023	18	13
CREATINE PHOSPHOKINASE	U/L	238	135	76	649	17	10
LACTATE DEHYDROGENASE	U/L	404	127	187	922	24	9
ALKALINE PHOSPHATASE	U/L	15	9	3	37	33	16
ALANINE AMINOTRANSFERASE	U/L	6	4	0	17	25	13
ASPARTATE AMINOTRANSFERASE	U/L	131	44	50	243	36	18
GAMMA GLUTAMYLTRANSFERASE	U/L	19	13	0	59	18	13
AMYLASE	U/L	652.5	362.8	392.2	1419	7	6
LIPASE	U/L	14.73	19.74	.5560	28.63	2	2
TOTAL PROTEIN (COLORIMETRY)	g/L	74	8	62	97	34	17
GLOBULIN (COLORIMETRY)	g/L	41	9	27	69	33	16
ALBUMIN (COLORIMETRY)	g/L	33	5	24	50	33	16
FIBRINOGEN	g/L	6.000	.0000	6.000	6.000	1	1
Body Temperature:	°C	37.1	0.5	36.0	38.0	11	6

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for females only, ages: > 3 years**

Sample results submitted by 17 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	8.274	2.379	4.500	16.10	85	24
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	5.14	0.79	3.30	7.62	52	19
HEMOGLOBIN	g/L	128	18	84	186	74	22
HEMATOCRIT	L/L	0.388	0.051	0.280	0.540	85	24
MCV	fL	76.0	5.5	59.1	88.5	51	19
MCH	pg/cell	25.9	1.6	18.8	29.2	51	18
MCHC	g/L	335	25	255	392	73	22
PLATELET COUNT	*10 <sup>12</sup> /L	.2460	.0820	.0580	.3730	24	8
NUCLEATED RED BLOOD CELLS	/100 WBC	0	0	0	0	11	4
RETICULOCYTES	%	0.0	0.0	0.0	0.0	10	3
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	5.303	1.839	2.100	13.20	76	23
LYMPHOCYTES	*10 <sup>9</sup> /L	2.248	0.928	0.590	5.720	76	23
MONOCYTES	*10 <sup>9</sup> /L	0.246	0.157	0.000	0.720	69	23
EOSINOPHILS	*10 <sup>9</sup> /L	0.251	0.195	0.000	0.746	58	19
BASOPHILS	*10 <sup>9</sup> /L	0.081	0.114	0.000	0.440	21	9
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.476	0.629	0.000	2.860	46	13
CALCIUM	mMol/L	2.70	0.35	2.00	4.33	71	22
PHOSPHORUS	mMol/L	1.71	0.23	1.07	2.16	70	20
SODIUM	mMol/L	134	3	128	141	69	22
POTASSIUM	mMol/L	3.7	0.5	2.7	4.8	72	23
CHLORIDE	mMol/L	94	3	88	104	69	22
BICARBONATE	mMol/L	25.7	3.4	20.0	30.0	10	3
CARBON DIOXIDE	mMol/L	26.8	2.6	21.0	31.0	29	7
OSMOLARITY	Osmol/L	.2690	.0040	.2660	.2710	2	1
IRON	µMol/L	28.64	8.234	13.25	43.32	12	5
MAGNESIUM	mMol/L	0.572	0.132	0.370	0.749	11	5
BLOOD UREA NITROGEN	mMol/L	3.213	1.071	1.428	7.854	73	23
CREATININE	µMol/L	133	27	80	212	72	23
URIC ACID	mMol/L	0.012	0.012	0.000	0.042	21	10
TOTAL BILIRUBIN	µMol/L	10	7	3	38	73	22
DIRECT BILIRUBIN	µMol/L	3	2	0	7	14	7
INDIRECT BILIRUBIN	µMol/L	10	7	3	24	14	7
GLUCOSE	mMol/L	5.328	1.388	2.886	10.38	74	23
CHOLESTEROL	mMol/L	3.963	.8029	2.383	5.853	71	22
TRIGLYCERIDE	mMol/L	.3503	.2034	.0226	.9831	37	11
CREATINE PHOSPHOKINASE	U/L	237	94	110	512	35	14
LACTATE DEHYDROGENASE	U/L	824	597	162	2638	55	17
ALKALINE PHOSPHATASE	U/L	20	11	4	45	68	22
ALANINE AMINOTRANSFERASE	U/L	8	5	0	24	44	20
ASPARTATE AMINOTRANSFERASE	U/L	127	33	50	235	73	23
GAMMA GLUTAMYLTRANSFERASE	U/L	17	11	5	52	29	14
AMYLASE	U/L	562.8	272.3	175.6	1259	17	11
LIPASE	U/L	4.726	3.892	.2780	10.01	5	5
TOTAL PROTEIN (COLORIMETRY)	g/L	68	7	55	90	66	22
GLOBULIN (COLORIMETRY)	g/L	36	6	22	54	65	20
ALBUMIN (COLORIMETRY)	g/L	31	5	21	41	65	20
FIBRINOGEN	g/L	6.110	7.810	2.000	20.00	5	4
GAMMA GLOBULIN (ELECTROPHORESIS)	g/L	15	0	15	15	1	1
ALBUMIN (ELECTROPHORESIS)	g/L	35	0	35	35	1	1
ALPHA-1 GLOBULIN (ELECTROPHORESIS)	g/L	0.003	0.000	0.002	0.003	2	2
ALPHA-2 GLOBULIN (ELECTROPHORESIS)	g/L	0.011	0.000	0.011	0.011	1	1
BETA GLOBULIN (ELECTROPHORESIS)	g/L	0.012	0.000	0.012	0.012	2	2
PROGESTERONE	nMol/L	2.242	6.048	.0318	21.08	20	4
Body Temperature:	°C	36.9	0.6	35.5	38.0	17	10

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for both sexes combined, ages: > 3 years**

Sample results submitted by 21 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	8.231	2.307	4.500	16.10	120	43
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	5.17	0.91	3.12	8.48	78	31
HEMOGLOBIN	g/L	130	19	84	205	103	37
HEMATOCRIT	L/L	0.390	0.052	0.280	0.569	120	43
MCV	fL	76.6	6.6	59.1	97.7	77	31
MCH	pg/cell	26.2	2.0	18.8	34.3	75	29
MCHC	g/L	336	24	255	392	102	37
PLATELET COUNT	*10 <sup>12</sup> /L	.2400	.1010	.0580	.5710	32	14
NUCLEATED RED BLOOD CELLS	/100 WBC	0	0	0	0	18	9
RETICULOCYTES	%	0.0	0.0	0.0	0.1	17	7
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	5.504	1.870	2.100	13.20	108	40
LYMPHOCYTES	*10 <sup>9</sup> /L	2.157	0.921	0.510	5.720	108	40
MONOCYTES	*10 <sup>9</sup> /L	0.253	0.172	0.000	0.872	98	39
EOSINOPHILS	*10 <sup>9</sup> /L	0.212	0.181	0.000	0.746	82	32
BASOPHILS	*10 <sup>9</sup> /L	0.064	0.101	0.000	0.440	35	16
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.408	0.561	0.000	2.860	64	22
ERYTHROCYTE SEDIMENTATION RATE		105	39	60	132	3	2
CALCIUM	mMol/L	2.68	0.28	2.00	3.53	107	39
PHOSPHORUS	mMol/L	1.74	0.23	1.20	2.20	103	37
SODIUM	mMol/L	134	3	127	142	98	38
POTASSIUM	mMol/L	3.8	0.5	2.7	4.8	104	39
CHLORIDE	mMol/L	95	3	88	104	102	38
BICARBONATE	mMol/L	25.0	4.6	13.0	30.0	14	6
CARBON DIOXIDE	mMol/L	26.9	2.6	21.0	31.0	34	11
OSMOLARITY	Osmol/L	.2690	.0040	.2660	.2710	2	1
IRON	µMol/L	28.28	9.666	13.25	51.73	19	11
MAGNESIUM	mMol/L	0.588	0.140	0.370	0.864	17	9
BLOOD UREA NITROGEN	mMol/L	3.570	1.071	1.428	7.854	111	42
CREATININE	µMol/L	133	27	53	212	104	39
URIC ACID	mMol/L	0.018	0.012	0.000	0.071	40	20
TOTAL BILIRUBIN	µMol/L	10	7	2	38	110	40
DIRECT BILIRUBIN	µMol/L	2	2	0	7	23	13
INDIRECT BILIRUBIN	µMol/L	9	7	3	24	23	13
GLUCOSE	mMol/L	5.328	1.332	2.831	10.38	112	42
CHOLESTEROL	mMol/L	3.807	.8547	.0000	5.853	108	40
TRIGLYCERIDE	mMol/L	.3390	.2034	.0226	.9831	55	24
CREATINE PHOSPHOKINASE	U/L	231	110	74	649	54	25
LACTATE DEHYDROGENASE	U/L	695	534	162	2638	82	28
ALKALINE PHOSPHATASE	U/L	19	11	3	53	103	39
ALANINE AMINOTRANSFERASE	U/L	8	5	0	31	72	35
ASPARTATE AMINOTRANSFERASE	U/L	130	42	48	314	111	42
GAMMA GLUTAMYLTRANSFERASE	U/L	17	10	0	52	46	26
AMYLASE	U/L	588.9	296.0	175.6	1419	24	17
LIPASE	U/L	7.506	10.01	.2780	28.63	7	7
TOTAL PROTEIN (COLORIMETRY)	g/L	69	8	55	94	101	40
GLOBULIN (COLORIMETRY)	g/L	37	7	22	63	99	37
ALBUMIN (COLORIMETRY)	g/L	32	5	21	50	99	37
FIBRINOGEN	g/L	6.090	6.980	2.000	20.00	6	5
GAMMA GLOBULIN (ELECTROPHORESIS)	g/L	15	0	15	15	1	1
ALBUMIN (ELECTROPHORESIS)	g/L	35	0	35	35	1	1
ALPHA-1 GLOBULIN (ELECTROPHORESIS)	g/L	0.003	0.000	0.002	0.003	2	2
ALPHA-2 GLOBULIN (ELECTROPHORESIS)	g/L	0.011	0.000	0.011	0.011	1	1
BETA GLOBULIN (ELECTROPHORESIS)	g/L	0.012	0.000	0.012	0.012	2	2
PROGESTERONE	nMol/L	2.242	6.048	.0318	21.08	20	4
Body Temperature:	°C	37.0	0.6	35.5	38.0	30	17

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for males only, all ages combined**

Sample results submitted by 17 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	8.603	2.201	5.300	14.70	55	32
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	5.26	1.00	3.12	8.48	38	21
HEMOGLOBIN	g/L	131	22	88	205	47	28
HEMATOCRIT	L/L	0.384	0.062	0.240	0.569	57	34
MCV	fL	74.5	8.6	56.9	97.7	38	21
MCH	pg/cell	25.8	2.7	20.9	34.3	38	21
MCHC	g/L	343	28	237	389	47	28
PLATELET COUNT	*10 <sup>12</sup> /L	.3290	.1720	.1470	.6560	10	9
NUCLEATED RED BLOOD CELLS	/100 WBC	0	0	0	0	7	5
RETICULOCYTES	%	0.0	0.0	0.0	0.1	7	4
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	5.809	1.854	2.880	11.70	51	28
LYMPHOCYTES	*10 <sup>9</sup> /L	2.352	1.192	0.510	6.320	52	29
MONOCYTES	*10 <sup>9</sup> /L	0.283	0.215	0.000	0.872	47	28
EOSINOPHILS	*10 <sup>9</sup> /L	0.120	0.082	0.000	0.312	35	20
BASOPHILS	*10 <sup>9</sup> /L	0.048	0.070	0.000	0.240	17	10
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.287	0.373	0.000	1.460	21	12
ERYTHROCYTE SEDIMENTATION RATE		127	7	122	132	2	1
CALCIUM	mMol/L	2.68	0.23	2.10	3.28	56	30
PHOSPHORUS	mMol/L	1.91	0.32	1.20	2.84	53	28
SODIUM	mMol/L	135	4	127	144	49	27
POTASSIUM	mMol/L	4.0	0.6	3.0	5.8	51	28
CHLORIDE	mMol/L	96	3	90	103	50	26
BICARBONATE	mMol/L	24.1	6.5	13.0	29.3	5	3
CARBON DIOXIDE	mMol/L	24.5	4.8	15.0	30.0	11	10
IRON	µMol/L	29.71	10.38	15.22	51.73	13	10
MAGNESIUM	mMol/L	3.415	9.351	0.288	30.03	10	6
BLOOD UREA NITROGEN	mMol/L	3.570	1.071	1.785	6.783	56	30
CREATININE	µMol/L	133	27	53	203	51	29
URIC ACID	mMol/L	0.018	0.012	0.000	0.071	27	16
TOTAL BILIRUBIN	µMol/L	10	9	2	38	56	30
DIRECT BILIRUBIN	µMol/L	2	2	0	5	15	10
INDIRECT BILIRUBIN	µMol/L	7	5	3	22	15	10
GLUCOSE	mMol/L	5.606	1.499	2.831	11.21	58	32
CHOLESTEROL	mMol/L	3.626	.8547	.0000	4.895	54	30
TRIGLYCERIDE	mMol/L	.3390	.2147	.0791	.9718	32	23
CREATINE PHOSPHOKINASE	U/L	263	168	76	723	27	18
LACTATE DEHYDROGENASE	U/L	450	259	185	1237	37	17
ALKALINE PHOSPHATASE	U/L	21	16	2	73	52	28
ALANINE AMINOTRANSFERASE	U/L	8	5	0	27	43	25
ASPARTATE AMINOTRANSFERASE	U/L	124	44	50	246	57	31
GAMMA GLUTAMYLTRANSFERASE	U/L	18	9	0	38	28	20
AMYLASE	U/L	544.6	316.5	111.0	1419	12	11
LIPASE	U/L	14.46	16.40	.5560	35.58	5	5
TOTAL PROTEIN (COLORIMETRY)	g/L	71	9	55	97	52	29
GLOBULIN (COLORIMETRY)	g/L	39	8	25	69	49	26
ALBUMIN (COLORIMETRY)	g/L	32	5	20	50	49	26
FIBRINOGEN	g/L	6.000	.0000	6.000	6.000	1	1
GAMMA GLOBULIN (ELECTROPHORESIS)	g/L	8	0	8	8	1	1
ALBUMIN (ELECTROPHORESIS)	g/L	34	0	34	34	1	1
ALPHA-1 GLOBULIN (ELECTROPHORESIS)	g/L	0.002	0.000	0.002	0.002	1	1
BETA GLOBULIN (ELECTROPHORESIS)	g/L	0.009	0.000	0.009	0.009	1	1
Body Temperature:	°C	37.1	0.6	36.0	38.0	22	12

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for females only, all ages combined**

Sample results submitted by 19 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	8.597	2.635	4.500	17.50	105	39
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	5.32	0.98	3.30	8.52	66	27
HEMOGLOBIN	g/L	127	19	81	186	90	33
HEMATOCRIT	L/L	0.383	0.054	0.278	0.540	107	39
MCV	fL	72.8	10.3	39.0	103.3	65	27
MCH	pg/cell	24.9	3.5	9.9	36.1	64	26
MCHC	g/L	335	26	254	394	89	33
PLATELET COUNT	*10 <sup>12</sup> /L	.2600	.0760	.0850	.3760	24	9
NUCLEATED RED BLOOD CELLS	/100 WBC	0	0	0	1	15	7
RETICULOCYTES	%	0.0	0.0	0.0	0.0	11	4
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	5.180	1.817	2.100	13.20	94	36
LYMPHOCYTES	*10 <sup>9</sup> /L	2.567	1.301	0.590	7.350	93	35
MONOCYTES	*10 <sup>9</sup> /L	0.276	0.183	0.000	0.875	84	34
EOSINOPHILS	*10 <sup>9</sup> /L	0.235	0.192	0.000	0.746	66	26
BASOPHILS	*10 <sup>9</sup> /L	0.076	0.109	0.000	0.440	24	11
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.464	0.627	0.000	2.860	52	18
CALCIUM	mMol/L	2.68	0.28	2.00	3.53	85	32
PHOSPHORUS	mMol/L	1.78	0.36	1.00	2.91	86	31
SODIUM	mMol/L	134	3	128	143	84	33
POTASSIUM	mMol/L	3.7	0.5	2.7	5.2	87	34
CHLORIDE	mMol/L	95	3	88	105	84	32
BICARBONATE	mMol/L	25.9	3.4	20.0	30.0	12	5
CARBON DIOXIDE	mMol/L	26.7	2.4	21.0	31.0	33	11
OSMOLARITY	Osmol/L	.2690	.0040	.2660	.2710	2	1
IRON	µMol/L	27.75	8.592	12.89	43.32	17	9
MAGNESIUM	mMol/L	0.564	0.123	0.370	0.749	14	8
BLOOD UREA NITROGEN	mMol/L	3.213	1.071	1.428	7.854	89	35
CREATININE	µMol/L	133	27	80	212	87	34
URIC ACID	mMol/L	0.012	0.012	0.000	0.042	30	17
TOTAL BILIRUBIN	µMol/L	10	7	3	38	88	33
DIRECT BILIRUBIN	µMol/L	3	2	0	7	22	12
INDIRECT BILIRUBIN	µMol/L	10	7	2	26	22	12
GLUCOSE	mMol/L	5.439	1.388	2.886	10.38	89	34
CHOLESTEROL	mMol/L	3.911	.9065	2.046	7.382	87	33
TRIGLYCERIDE	mMol/L	.3390	.1921	.0226	.9831	48	21
CREATINE PHOSPHOKINASE	U/L	237	89	110	512	41	20
LACTATE DEHYDROGENASE	U/L	816	583	162	2638	67	25
ALKALINE PHOSPHATASE	U/L	22	13	4	61	83	33
ALANINE AMINOTRANSFERASE	U/L	9	5	0	27	58	30
ASPARTATE AMINOTRANSFERASE	U/L	127	40	50	314	89	34
GAMMA GLUTAMYLTRANSFERASE	U/L	19	18	5	97	36	20
AMYLASE	U/L	612.5	362.6	175.6	1674	23	16
LIPASE	U/L	10.56	19.18	.2780	56.99	8	7
TOTAL PROTEIN (COLORIMETRY)	g/L	67	8	52	90	81	32
GLOBULIN (COLORIMETRY)	g/L	36	6	22	54	80	31
ALBUMIN (COLORIMETRY)	g/L	31	5	21	41	80	31
FIBRINOGEN	g/L	6.110	7.810	2.000	20.00	5	4
GAMMA GLOBULIN (ELECTROPHORESIS)	g/L	10	8	4	15	2	2
ALBUMIN (ELECTROPHORESIS)	g/L	36	1	35	36	2	2
ALPHA-1 GLOBULIN (ELECTROPHORESIS)	g/L	0.003	0.000	0.002	0.003	3	3
ALPHA-2 GLOBULIN (ELECTROPHORESIS)	g/L	0.011	0.000	0.011	0.011	1	1
BETA GLOBULIN (ELECTROPHORESIS)	g/L	0.012	0.000	0.012	0.012	3	3
PROGESTERONE	nMol/L	2.140	5.915	.0318	21.08	21	5
Body Temperature:	°C	36.9	0.6	35.5	38.0	25	16

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Physiological reference ranges calculated for both sexes combined, all ages combined**

Sample results submitted by 23 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	8.557	2.500	4.500	17.50	162	71
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	5.27	1.01	2.55	8.52	107	49
HEMOGLOBIN	g/L	128	20	81	205	137	60
HEMATOCRIT	L/L	0.384	0.055	0.260	0.569	165	72
MCV	fL	73.9	10.2	39.0	109.8	105	48
MCH	pg/cell	25.3	3.3	9.9	36.1	103	47
MCHC	g/L	338	27	237	394	135	59
PLATELET COUNT	*10 <sup>12</sup> /L	.2650	.1220	.0580	.6560	37	19
NUCLEATED RED BLOOD CELLS	/100 WBC	0	0	0	0	20	10
RETICULOCYTES	%	0.0	0.0	0.0	0.1	18	8
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	5.402	1.848	2.100	13.20	145	63
LYMPHOCYTES	*10 <sup>9</sup> /L	2.490	1.263	0.510	7.350	145	63
MONOCYTES	*10 <sup>9</sup> /L	0.279	0.194	0.000	0.875	131	62
EOSINOPHILS	*10 <sup>9</sup> /L	0.195	0.171	0.000	0.746	101	45
BASOPHILS	*10 <sup>9</sup> /L	0.064	0.095	0.000	0.440	41	21
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.413	0.569	0.000	2.860	73	30
ERYTHROCYTE SEDIMENTATION RATE		105	39	60	132	3	2
CALCIUM	mMol/L	2.68	0.28	2.00	3.53	143	62
PHOSPHORUS	mMol/L	1.84	0.36	1.00	2.91	139	58
SODIUM	mMol/L	134	3	127	144	134	60
POTASSIUM	mMol/L	3.8	0.5	2.7	5.8	139	62
CHLORIDE	mMol/L	95	3	88	105	136	58
BICARBONATE	mMol/L	26.1	3.1	20.0	30.0	16	8
CARBON DIOXIDE	mMol/L	26.4	2.8	19.0	31.0	43	19
OSMOLARITY	Osmol/L	.2690	.0040	.2660	.2710	2	1
IRON	µMol/L	28.64	9.308	12.89	51.73	30	19
MAGNESIUM	mMol/L	0.543	0.148	0.288	0.864	25	14
BLOOD UREA NITROGEN	mMol/L	3.570	1.071	1.428	7.854	147	65
CREATININE	µMol/L	133	27	80	212	139	62
URIC ACID	mMol/L	0.012	0.012	0.000	0.071	60	34
TOTAL BILIRUBIN	µMol/L	10	7	2	38	146	63
DIRECT BILIRUBIN	µMol/L	2	2	0	7	37	22
INDIRECT BILIRUBIN	µMol/L	9	7	2	26	37	22
GLUCOSE	mMol/L	5.495	1.443	2.831	11.21	149	66
CHOLESTEROL	mMol/L	3.781	.8288	.0000	5.853	142	63
TRIGLYCERIDE	mMol/L	.3390	.1921	.0565	.9831	79	43
CREATINE PHOSPHOKINASE	U/L	242	127	74	723	70	38
LACTATE DEHYDROGENASE	U/L	680	518	162	2638	106	42
ALKALINE PHOSPHATASE	U/L	22	14	2	73	137	61
ALANINE AMINOTRANSFERASE	U/L	9	6	0	31	104	56
ASPARTATE AMINOTRANSFERASE	U/L	125	42	48	314	147	65
GAMMA GLUTAMYLTRANSFERASE	U/L	18	12	0	63	64	40
AMYLASE	U/L	589.2	344.3	111.0	1674	35	27
LIPASE	U/L	11.95	17.51	.2780	56.99	13	12
TOTAL PROTEIN (COLORIMETRY)	g/L	68	8	52	94	134	61
GLOBULIN (COLORIMETRY)	g/L	37	7	22	63	130	57
ALBUMIN (COLORIMETRY)	g/L	31	5	20	50	130	57
FIBRINOGEN	g/L	6.090	6.980	2.000	20.00	6	5
GAMMA GLOBULIN (ELECTROPHORESIS)	g/L	9	6	4	15	3	3
ALBUMIN (ELECTROPHORESIS)	g/L	35	1	34	36	3	3
ALPHA-1 GLOBULIN (ELECTROPHORESIS)	g/L	0.002	0.000	0.002	0.003	4	4
ALPHA-2 GLOBULIN (ELECTROPHORESIS)	g/L	0.011	0.000	0.011	0.011	1	1
BETA GLOBULIN (ELECTROPHORESIS)	g/L	0.011	0.002	0.009	0.012	4	4
PROGESTERONE	nMol/L	2.140	5.915	.0318	21.08	21	5
Body Temperature:	°C	37.0	0.6	35.5	38.0	49	29

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.

**Average weights calculated for males only**

Weights submitted by ISIS member institutions.

<b>Age Grouping</b>	<b>Units</b>	<b>Mean</b>	<b>St. Dev.</b>	<b>Minimum Value</b>	<b>Maximum Value</b>	<b>Sample Size<sup>a</sup></b>	<b>Animals<sup>b</sup></b>
0.9-1.1 years	Kg	230.5	27.5	187.0	256.4	8	5
2.7-3.3 years	Kg	298.4	17.8	282.0	330.0	9	6
4.5-5.5 years	Kg	337.7	4.1	329.1	344.5	29	2

<sup>a</sup> Number of samples used to calculate the reference range.<sup>b</sup> Number of different individuals contributing to the reference values.**Average weights calculated for females only**

Weights submitted by ISIS member institutions.

<b>Age Grouping</b>	<b>Units</b>	<b>Mean</b>	<b>St. Dev.</b>	<b>Minimum Value</b>	<b>Maximum Value</b>	<b>Sample Size<sup>a</sup></b>	<b>Animals<sup>b</sup></b>
4.5-5.5 years	Kg	306.6	34.6	227.0	360.0	10	4

<sup>a</sup> Number of samples used to calculate the reference range.<sup>b</sup> Number of different individuals contributing to the reference values.**Average weights calculated for both sexes combined**

Weights submitted by ISIS member institutions.

<b>Age Grouping</b>	<b>Units</b>	<b>Mean</b>	<b>St. Dev.</b>	<b>Minimum Value</b>	<b>Maximum Value</b>	<b>Simple Size<sup>a</sup></b>	<b>Animals<sup>b</sup></b>
0-1 days	Kg	9.140	1.609	6.818	12.27	10	10
6-8 days	Kg	12.70	1.33	10.91	14.55	8	5
0.9-1.1 years	Kg	214.3	42.2	136.0	256.4	11	8
1.8-2.2 years	Kg	321.2	15.3	300.0	343.2	5	4
2.7-3.3 years	Kg	300.9	16.2	282.0	330.0	12	7
4.5-5.5 years	Kg	333.0	14.6	280.0	360.0	39	5

<sup>a</sup> Number of samples used to calculate the reference range.<sup>b</sup> Number of different individuals contributing to the reference values.



**Normal Physiological Values  
for Mountain / Woolly Tapir  
*Tapirus Pinchaque***

International Species Information System

2002

**Physiological reference ranges calculated for both sexes combined, all ages combined**

Sample results submitted by 3 member institutions.

Test	Units	Mean	St. Dev.	Minimum Value	Maximum Value	Sample Size <sup>a</sup>	Animals <sup>b</sup>
WHITE BLOOD CELL COUNT	*10 <sup>9</sup> /L	5.932	1.044	3.740	7.400	30	12
RED BLOOD CELL COUNT	*10 <sup>12</sup> /L	8.66	1.72	5.11	11.50	21	7
HEMOGLOBIN	g/L	107	16	78	136	22	8
HEMATOCRIT	L/L	0.319	0.051	0.220	0.416	29	12
MCV	fL	38.0	7.9	30.1	66.5	20	7
MCH	pg/cell	12.9	2.2	9.0	18.8	20	7
MCHC	g/L	346	34	282	396	22	8
PLATELET COUNT	*10 <sup>12</sup> /L	.3110	.0610	.1930	.3930	15	7
SEGMENTED NEUTROPHILS	*10 <sup>9</sup> /L	3.787	1.031	1.480	5.510	30	12
LYMPHOCYTES	*10 <sup>9</sup> /L	1.830	0.523	0.989	3.250	30	12
MONOCYTES	*10 <sup>9</sup> /L	0.166	0.104	0.062	0.513	24	9
EOSINOPHILS	*10 <sup>9</sup> /L	0.160	0.137	0.051	0.592	24	9
BASOPHILS	*10 <sup>9</sup> /L	0.068	0.000	0.068	0.068	1	1
NEUTROPHILIC BANDS	*10 <sup>9</sup> /L	0.190	0.131	0.037	0.392	8	5
CALCIUM	mMol/L	2.65	0.15	2.35	2.93	33	12
PHOSPHORUS	mMol/L	1.62	0.32	1.00	2.33	33	12
SODIUM	mMol/L	135	4	127	147	32	11
POTASSIUM	mMol/L	3.8	0.3	3.3	4.3	32	12
CHLORIDE	mMol/L	102	4	92	109	29	10
CARBON DIOXIDE	mMol/L	20.4	3.0	16.0	24.0	17	8
IRON	µMol/L	46.00	12.17	33.65	70.71	8	4
MAGNESIUM	mMol/L	1.016	0.062	0.905	1.070	9	4
BLOOD UREA NITROGEN	mMol/L	3.570	1.785	1.785	10.35	30	12
CREATININE	µMol/L	88	27	44	141	31	12
URIC ACID	mMol/L	0.000	0.000	0.000	0.000	2	1
TOTAL BILIRUBIN	µMol/L	12	9	2	46	30	12
DIRECT BILIRUBIN	µMol/L	3	2	0	7	20	11
INDIRECT BILIRUBIN	µMol/L	10	10	0	43	20	11
GLUCOSE	mMol/L	5.939	.9435	4.496	8.270	31	12
CHOLESTEROL	mMol/L	2.849	.4144	2.072	4.170	27	10
TRIGLYCERIDE	mMol/L	.5311	.4407	.2260	1.808	11	5
CREATINE PHOSPHOKINASE	U/L	242	109	97	523	28	12
LACTATE DEHYDROGENASE	U/L	349	22	322	375	5	4
ALKALINE PHOSPHATASE	U/L	74	33	10	144	28	11
ALANINE AMINOTRANSFERASE	U/L	6	3	0	10	18	7
ASPARTATE AMINOTRANSFERASE	U/L	39	10	24	67	30	11
GAMMA GLUTAMYLTRANSFERASE	U/L	22	11	9	60	24	9
AMYLASE	U/L	429.8	.0000	429.8	429.8	1	1
LIPASE	U/L	6.950	.0000	6.950	6.950	1	1
TOTAL PROTEIN (COLORIMETRY)	g/L	64	4	56	73	28	11
GLOBULIN (COLORIMETRY)	g/L	31	4	23	41	29	11
ALBUMIN (COLORIMETRY)	g/L	33	3	27	42	29	11
FIBRINOGEN	g/L	3.480	1.440	2.000	6.300	9	3
CORTISOL	nMol/L	207	3	204	210	2	2
TOTAL TRIIODOTHYRONINE	nMol/L	1.509	1.351	0.554	2.464	2	2
TOTAL THYROXINE	nMol/L	9	13	5	44	10	4
Body Temperature:	°C	37.0	0.1	36.9	37.0	3	2

<sup>a</sup> Number of samples used to calculate the reference range.

<sup>b</sup> Number of different individuals contributing to the reference values.